

## **DECLARATION**

Student number: **658-082-3**

I declare that A CONSTRUCTIVIST APPROACH IN INSTRUCTIONAL DESIGN AND ASSESSMENT PRACTICE hereby submitted for the degree Doctor of Education at the University of South Africa is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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Signature

(Mrs C Booyse)

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Date

As early as the 1980s, Carl Rogers reflected on *effective learning* which had an impact on my thinking.

Rogers: “I want to talk about *learning*. But *not* the lifeless, sterile, futile, quickly forgotten stuff that is crammed into the mind of the poor helpless individual tied into his seat by ironclad bonds of conformity! I am talking about **LEARNING** - the insatiable curiosity that drives the adolescent boy to absorb everything he can see or hear or read about gasoline engines in order to improve the efficiency and speed of his “cruiser”. I am talking about the student who says, “I am *discovering, drawing in from the outside, and making that which is drawn in a real part of me.*” I am talking about any learning in which the experience of the learner progresses along this line: “No, no, that's not what I want”; “Wait! This is closer to what I am interested in, what I need”; “Ah, here it is! Now I'm *grasping and comprehending what I need and what I want to know!*” (Carl Rogers 1983: 18-19)



***I dedicate the work to all educators with a passion for teaching and the will to make a difference in every learner’s life.***

*Acknowledgement: The illustration is of a sculpture by Desiree Hope*

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## **KEY CONCEPTS**

Learning

Learning theory

Approach to learning

Mediated learning

Constructivism

Instructional design

Teaching strategy

Learner-centredness

Assessment

Purposes of assessment

Taxonomy

Motivation

Metacognitive learning and teaching

## SUMMARY

In a globally interdependent world, teachers are charged with preparing learners for a complex, interactive world. This educational challenge requires teachers to develop learners with critical, creative and conceptual minds, while still teaching the required content. Therefore developing the individual learner's ability to construct personalised meaning for new concepts is a prerequisite for the classroom. So is the development of the learner's ability to solve increasingly complex problems in the learning area as well as in daily life. This revivifies the question of how to plan, structure and assess in order to accommodate these requirements while enhancing learner abilities and achievement.

Through this study the researcher aimed to find ways to structure and to transfer knowledge in order to develop what Anderson and Krathwohl (2001: 42) call "deeper understanding" and what Erickson (2007: 38) explains as shaping a "conceptual mind". Therefore the main aim of this study was to explore and find ways how the application of a constructivist approach in instructional design and assessment practice can result in more effective teaching, learning and assessment.

The research showed that knowledge of theoretical frameworks to base instructional design and assessment practice on will enhance planning, choices of teaching strategies and the setting of assessment tasks. As a result of the research findings, the researcher proposes a model (*Appendix H*) illustrating a teaching-learning situation where the learner *can learn to learn how to learn* and has the capability of modifying the underlying structure of his or her cognition. In such a conducive teaching, learning and assessment process, language and prior knowledge prove to be pivotal to enable a learner to broaden his or her understanding within diverse contexts. This implies that both learner and teacher need to be metacognitively involved when teaching and assessment are planned. Learners need to become as aware of the "how" of their learning as they are of the "what" to gradually develop a greater understanding of how best to learn. Furthermore, it means that the teacher's involvement does not end at teaching, but stretches further into a mediated assessment process.

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# TABLE OF CONTENTS

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DECLARATION.....	I
ACKNOWLEDGEMENTS.....	III
KEY CONCEPTS .....	IV
SUMMARY.....	V
LIST OF TABLES .....	XII
LIST OF DIAGRAMS.....	XII
LIST OF FIGURES .....	XIII
LIST OF APPENDICES.....	XIV
<b>1. CHAPTER 1: INTRODUCTORY ORIENTATION AND STATEMENT OF THE PROBLEM.....</b>	<b>1</b>
<b>1.1 BACKGROUND TO THE RESEARCH.....</b>	<b>1</b>
<b>1.2 RATIONALE FOR STUDY .....</b>	<b>4</b>
<b>1.3 STATEMENT OF THE RESEARCH PROBLEM .....</b>	<b>6</b>
<b>1.4 AIMS OF THE RESEARCH.....</b>	<b>7</b>
<b>1.5 EXPLANATION OF RELEVANT CONCEPTS.....</b>	<b>8</b>
<b>1.5.1 Learning.....</b>	<b>9</b>
<b>1.5.2 An approach to learning.....</b>	<b>10</b>
<b>1.5.3 A constructivist approach to learning.....</b>	<b>10</b>
<b>1.5.4 Learner-centredness .....</b>	<b>12</b>
<b>1.5.5 Teaching.....</b>	<b>12</b>
<b>1.5.6 Teaching strategy .....</b>	<b>13</b>
<b>1.5.7 Instructional design .....</b>	<b>14</b>
<b>1.5.8 Assessment practice .....</b>	<b>15</b>
<b>1.5.9 Purpose of assessment.....</b>	<b>15</b>
<b>1.5.10 Taxonomy .....</b>	<b>16</b>
<b>1.5.11 Attitude and motivation .....</b>	<b>16</b>
<b>1.6 RESEARCH DESIGN .....</b>	<b>17</b>
<b>1.6.1 Literature review .....</b>	<b>19</b>
<b>1.6.2 Research methods .....</b>	<b>20</b>
<b>1.6.2.1 Action research .....</b>	<b>20</b>
<b>1.6.2.2 Focus group discussions .....</b>	<b>21</b>

1.6.2.3	Open questions.....	22
1.6.2.4	Research project .....	22
1.6.3	Sampling .....	23
1.7	DIVISION INTO CHAPTERS .....	24
1.8	CONCLUSION.....	26
<b>2.</b>	<b>CHAPTER 2: APPROACHES TO LEARNING AND VIEWS OF THE LEARNER.....</b>	<b>27</b>
2.1	INTRODUCTION.....	27
2.2	APPROACHES TO LEARNING.....	27
2.2.1	Behaviourism.....	29
2.2.1.1	Skinner and behaviourism.....	31
2.2.1.2	Emphasising the setting of objectives .....	33
2.2.1.3	Motivation and behaviourism.....	33
2.2.2	Cognitivism.....	34
2.2.3	A constructivist approach .....	36
2.3	JEROME SEYMOUR BRUNER (1915-) .....	37
2.3.1	Bruner's The Process of Education (1960) .....	38
2.3.2	Bruner's theory on instruction .....	40
2.3.3	Bruner on discovery learning .....	41
2.4	JEAN PIAGET (1896–1980) .....	43
2.4.1	Piaget's view of the learner's mind.....	44
2.4.2	The developmental process .....	45
2.4.3	Constructing knowledge and meaning through accommodation and assimilation .....	46
2.5	LEV VYGOTSKY (1896-1934).....	48
2.5.1	Social interaction as core of cognitive development .....	50
2.5.2	Vygotsky's view on zone of proximal development (ZPD).....	51
2.5.3	Language: The core of learning.....	52
2.5.4	Vygotskian views of social cognition and learning.....	53
2.5.5	Piaget and Vygotsky's views compared .....	55
2.6	REUVEN FEUERSTEIN (1921- ) .....	57
2.7	A SOCIAL CONSTRUCTIVIST VIEW OF THE LEARNER.....	59
2.7.1	The learner as a unique individual.....	59
2.7.2	The importance of the background and culture of the learner .....	60

2.7.3	The motivation for learning .....	61
2.7.4	Learning as an active, social process.....	61
2.8	CONCLUSION.....	63

### 3. CHAPTER 3: VIEWS ON INSTRUCTIONAL DESIGN AND ASSESSMENT

PRACTICE .....	64
3.1 INTRODUCTION.....	64
3.2 INSTRUCTIONAL DESIGN.....	64
3.2.1 Behaviourism and instructional design.....	65
3.2.2 Cognitivism and instructional design.....	66
3.2.3 Constructivism and instructional design .....	68
3.3 THE NATURE OF CONSTRUCTIVIST TEACHING STRATEGIES .....	72
3.3.1 Characteristics of constructivist teaching.....	72
3.3.2 Dynamic interaction between task, teacher and learner .....	74
3.4 CONSTRUCTIVIST TEACHING STRATEGIES .....	75
3.4.1 Scaffolding builds learning bridges.....	75
3.4.2 Simulation as discovery learning in action .....	77
3.4.3 Problem-solving as teaching strategy.....	78
3.4.4 Discussion as a teaching strategy.....	79
3.5 THE USE OF A TAXONOMY IN ASSESSMENT .....	80
3.5.1 Bloom’s 1956 taxonomy.....	81
3.5.2 The cognitive domain of thinking in different taxonomies .....	82
3.5.3 The affective domain.....	87
3.5.4 The psychomotor domain in different taxonomies .....	88
3.6 CLASSROOM ASSESSMENT .....	90
3.6.1 The purpose of assessment in the classroom .....	91
3.6.2 A constructive assessment process .....	92
3.6.2.1 The role of prior knowledge .....	93
3.6.2.2 Validity, reliability and fairness in classroom assessment.....	94
3.6.2.3 The outcomes – assessment criteria link in assessment practice.....	95
3.6.2.4 The diagnostic character of constructivist assessment.....	96
3.6.2.5 The formative characteristic of constructivist assessment .....	97
3.7 CONCLUSION.....	97



<b>4.</b>	<b>CHAPTER 4: RESEARCH DESIGN</b> .....	<b>99</b>
4.1	INTRODUCTION.....	99
4.2	RESEARCH DESIGN .....	99
4.2.1	Qualitative research design.....	100
4.2.2	Action research.....	104
4.3	SAMPLING .....	105
4.4	ETHICAL CONSIDERATIONS.....	109
4.4.1	The role of the researcher-participant observation.....	110
4.4.2	The costs/benefits ratio .....	111
4.4.3	Informed consent as a dialogue .....	111
4.4.4	Access and acceptance .....	113
4.5	THE VALUE OF A LITERATURE REVIEW.....	114
4.6	DATA COLLECTION .....	114
4.6.1	Focus group discussions and observation.....	117
4.6.2	Open questions (see Appendix C).....	118
4.6.3	Research project (Appendix G).....	120
4.7	REFLEXIVITY .....	121
4.8	VALIDITY.....	123
4.8.1	Credibility .....	124
4.8.2	Theoretical validity .....	125
4.8.3	Inferential validity .....	125
4.8.4	Transferability.....	126
4.9	CONCLUSION.....	127
<b>5.</b>	<b>CHAPTER 5: RESULTS OF THE EMPIRICAL STUDY</b> .....	<b>128</b>
5.1	INTRODUCTION.....	128
5.2	REFLECTION ON THE RESEARCH PROCESS .....	128
5.3	FINDINGS IN THE QUALITATIVE RESEARCH PROCESS.....	129
5.3.1	Focus group discussions in Stage 1 of research (Appendices A and B) .....	129
5.3.1.1	Findings of Focus Group 1 discussion .....	131
5.3.1.2	Findings of Focus Group 2 discussion .....	132
5.3.1.3	Findings of Focus Group 3 discussion .....	133
5.3.1.4	Findings of Focus Group 4 discussion .....	135
5.3.2	Reflection on the whole group discussion of open questions (Appendix C) .....	136

5.3.3	Reflection on the research project (Appendix G) .....	138
5.3.3.1	Findings regarding the assessment practice.....	142
5.3.3.2	Findings regarding formative feedback .....	143
5.3.3.3	Findings regarding reflection and feedback by learners .....	147
5.3.3.4	Findings regarding reflection and feedback by teachers .....	150
5.4	CONCLUSION.....	152
<b>6.</b>	<b>CHAPTER 6: CONCLUDING PERSPECTIVES, RECOMMENDATIONS AND APPLICATIONS.....</b>	<b>154</b>
6.1	INTRODUCTION.....	154
6.2	OVERVIEW OF THE RESEARCH PROCESS .....	155
6.3	SYNTHESIS OF FINDINGS .....	157
6.3.1	Aim 1: To explore different approaches to learning and views on the cognitive development of the learner .....	158
6.3.2	Aim 2: To investigate views on instructional design and the theoretical framework in which instructional design is done .....	160
6.3.3	Aim 3: To identify particular teaching strategies for a constructivist framework.....	165
6.3.4	Aim 4: To explore the role of motivation in teaching, learning and assessment practices.....	166
6.3.5	Aim 5: To investigate the purposes and application of assessment.....	167
6.3.6	Aim 6: To determine the impact of constructive feedback on the teaching and assessment process .....	168
6.3.7	Aim 7: To present a conceptual model to illustrate how a constructivist understanding and the application of it may improve quality in instructional design and efficacy in assessment practice (see Appendix H: Constructive model for instructional design and assessment practice). .....	170
6.4	RECOMMENDATIONS FOR APPLICATION OF CONSTRUCTIVE INSTRUCTIONAL DESIGN AND ASSESSMENT PRACTICE.....	180
6.4.1	Meso-level global application (Appendix I).....	180
6.4.2	Macro-level national recommendations and application .....	182
6.4.3	Micro-level classroom recommendations and application.....	187
6.4.3.1	Constructive choice of teaching strategies.....	188
6.4.3.2	The necessity of questions and questioning in enabling learning.....	190

6.4.3.3	Constructive choices of the purpose and application of assessment .....	192
6.5	LIMITATIONS OF THE STUDY .....	199
6.6	RECOMMENDATIONS FOR FURTHER RESEARCH INITIATIVES .....	199
6.7	CONCLUDING REMARKS .....	200
7.	BIBLIOGRAPHY .....	202

## **LIST OF TABLES**

Table 2.1: A summary of the four orientations to learning.....	28
Table 3.1: Gagné’s taxonomy of learning outcomes.....	83
Table 3.2: Summary of the psychomotor domain as seen by Simpson (1972), Harrow (1972) and Dave (1975).....	89
Table 4.1: Per category summary of profile un- and under-qualified teachers.....	107
Table 5.1: Core findings in discussion of open questions (Appendix C).....	137
Table 5.2: Outcome 2 – Able to design a formative assessment task that is appropriately linked to a learning programme .....	143
Table 5.3: Outcome 5 - Reflective report: Able to review, reflect on and evaluate the assessment process.....	151
Table 6.1: Summary from literature study of behaviourist, cognitivist and constructivist views of learning.....	158
Table 6.2: Theoretical approaches - strengths, weaknesses and perceived application .....	162
Table 6.3: Taxonomy of thinking skills and applied cognitive demand levels.....	185

## **LIST OF DIAGRAMS**

Diagram 4.1: Summary of the research process.....	116
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## LIST OF FIGURES

Figure 2.1: Assimilation of knowledge as adapted from Atherton, 2005 .....	47
Figure 2.2: Accommodation of knowledge as adapted from Atherton, 2005 .....	48
Figure 3.1: Behavioural, cognitive and constructivist instructional strategies .....	70
Figure 3.2: Categories in the cognitive domain of Bloom's taxonomy as revised by Anderson and Krathwohl (2001) .....	85
Figure 5.1: Teacher's feedback on assessment task .....	145
Figure 5.2: Learner feedback on English task .....	148
Figure 5.3: Learner feedback on Mathematics task .....	148
Figure 5.4: Feedback from learners on money activity .....	149
Figure 6.1: Constructive instructional design .....	171
Figure 6.2: Formative assessment practice .....	172
Figure 6.3: Conducive teaching, learning and assessment process .....	173
Figure 6.4: Constructive model for instructional design and assessment practice .....	178

## LIST OF APPENDICES

Appendix A: Participant consent form.....	229
Appendix B: Tutor consent form .....	231
Appendix C: Open Questions.....	233
Appendix D: Permission to access and use of data.....	234
Appendix E: Classroom Assessment (EDUC2002) July 2008 contact programme .....	235
Appendix F: September 2008 Contact session Classroom Assessment - EDUC 2002 .....	259
Appendix G: Examination Equivalent for Classroom Assessment (EDUC 2002) – 2008 ....	279
Appendix H: Constructive model for instructional design and assessment practice .....	290
Appendix I: Conference paper delivered at the IAEA 2010 .....	292

# CHAPTER 1: INTRODUCTORY ORIENTATION AND STATEMENT OF THE PROBLEM

## 1.1 BACKGROUND TO THE RESEARCH

Thirty years later, Bennett and Dunne in their article “*How children learn*” (1994) reconfirm the 1964 ideas of Piaget and Skinner that learning happens through an *active process* which could eventually lead to a specific behavioural change. Ten years thereafter, Borich and Tombari (2004: 2-6) reaffirm the idea of change, but point out that learning entails more than the accumulation of facts. Rather, they view learning as an *act of thinking, the ability to reorganise knowledge, being aware of oneself as a learner and being able to transfer new learning to new situations.*

Thoughts about what learning entails also reminds one of the shift during the early 1990s from the industrial age to the information age as described in a document from the *U.S. Department of Labor* (June 1991: xvii-xviii). This document clearly states that effective learning requires higher order thinking as an ability to access, interpret, analyze, and use information for making decisions. Eighteen years later (in 2008), the need for this global trend to emphasize skills and competencies to succeed in the workplace is more evident than ever. In *The Herald* of 22 September 2005, the previous Education Minister Naledi Pandor argues that matric examination question papers should portray the specific abilities that are appropriate for a global need. She made it clear that “matric” (Grade 12) candidates should be able to demonstrate cognitive skills related to problem-solving as well as extended writing skills. Christie (2008: 41) explains in her book *Opening the doors of learning* that the challenges of globalization in contemporary society call for new understanding and more innovative theoretical approaches in the educational situation. Christie (2008: 41) argues that the global scale opens a terrain where especially education is called upon to respond to the new challenges to prepare learners as responsible citizens and future workforce. From another voice the same concern is verbalised by Trevor Manuel (Beeld, 2009/07/15: 2) where he sets out the objectives for education in the government’s medium-term strategic framework as the head of the new National Planning Commission in the Presidency in 2009. Manuel mentions that the aim is to improve

learner performance by twenty per cent by 2014 according to key indicators set in *global demand*. He claims that the government also envisages improving the performance of learners in comparative studies with other countries – which gives a clear indication that the global requirement for abilities and skills is taken to heart in the South African educational system. Erickson (2007: 1) explains that in a globally interdependent world, the concept “complexity” frames the socio-political and environmental issues of the day, which may also mean that teachers are charged with preparing learners for this complex, interactive world. The reality of this educational challenge includes especially to foster the development of critical, creative and conceptual minds of learners, but still to include the required content in planning and teaching. Pink, in his book “*A Whole new mind: Moving from the Information Age to the Conceptual Age*” (2005: 1-69) highlights the increasing importance of creative thinking and the ability to construct one’s own meaning to new concepts by being able to solve increasingly complex problems in daily life. This creative thinking ability will almost certainly include metacognitive assessment of the thinking. This notion of metacognitive assessment reinforces the idea that assessment needs to reflect how significant understanding at the conceptual level can be established, how understanding can be transferred across time and situations and how the assessment presupposes the relation with prior knowledge in order to confirm the understanding of patterns and connections (Ritchart, 2002: 29; Paul, 1995: 1, 2).

In *Business Day of 20 Jan 2006*, Mahommed claims that senior educational advisers would react on the urgent matter of the poor quality of teaching which inhibits the learner’s ability to develop more advanced cognitive skills. The core of the cover story of the *Financial Mail* of 8 September 2006, reiterated the urgency of well-structured, quality teaching and assessment because according to many in the financial sector, poor quality teaching is the key reason why the education system is failing so many schools. Beeld (2009/09/29: 7) reports on a conference on early childhood development in Cape Town where Professor Jean Baxen of the Faculty of Education at Rhodes University in Grahamstown argues that access to education is not only about greater learner numbers in schools, but also to *equip learners to access knowledge and create knowledge by improving at the level of the theory of knowledge*. Quality teaching, learner ability and performance also motivated the Centre for Development and Enterprise (CDE) to investigate and address specifically the maths and science challenge in South African



schools. It is mentioned in the CDE report (2007: 12) that the private sector has a profound interest in an improved schooling system. The CDE report “Doubling the Growth” (2007: 7), verbalises that radical improvement regarding abilities is necessary because there is a critical shortfall of particular skills and abilities in learners leaving school, which is a significant constraint in the South African economical growth. In this CDE report (2007: 10, 13) *language proficiency, a lack of subject knowledge, the availability of teachers, planning and the ways how assessment is taking place* are identified as crucial factors in learner performance.

The notion of active learning which focuses on the provision of a platform for developing knowledge, skills and competencies for innovation, social development and economic growth, lies at the heart of every “modern” curriculum reform. These ideas are also central to the World Bank Working Paper, No 128 (2008: 43-45). From the investigation done by the World Bank (as reported in World Bank Working Paper, No 128), the pedagogical idea behind active learning is to provide learners with the opportunity for active engagement with learning matter for them to construct knowledge themselves instead of reciting facts. Regarding planning and the choice of teaching strategies, it seems clear that the underlying methodological principles which may lead to improved and adapted classroom activities are centred around learner participation with the emphasis on holistic development, critical thinking and the integration of knowledge (World Bank, 2008: 44).

The researcher is also of the opinion that instructional design and assessment practices should be understood as the practice of organising systematic learning and to relocate it again at the heart of the educational system.

Views and reports from within the educational sphere, the labour market and even globally, voice the same quest for rethinking how learning is taking place, how effective teaching can be established and how quality assessment can be developed. This also means that the role of planning, the choice of teaching strategies and the planning of assessment and its impact on the teaching-learning-assessment situation can be identified.

This study presents an opportunity to identify ways how the teacher can be empowered by the application of a constructivist approach, in order for effective teaching, learning and

assessment to take place. The search to find how constructivist ideas impact on instructional design and assessment practice will enable the researcher to introduce teaching strategies and a model which can empower teachers to work towards more effective teaching, learning and quality assessment.

The rationale of this research will now be discussed in more detail.

## **1.2 RATIONALE FOR STUDY**

Erickson (2007: 25) argues that changes in the skills and knowledge needed for new abilities and good performance, will affect the understanding of how learners learn as well as the relationship between assessment and instruction. She explains the need to shift from the mere informative to reach the conceptual levels of understanding as a process in which learners not only grasp the critical factual knowledge, but understand the generalisations and principles and therefore can apply the processes and skills. Consequently, to accommodate such a shift, the instructional design and assessment practice also has to change in such a manner as to tie assessment design and content to new outcomes and purposes for assessment.

Bransford, Brown and Cocking (2000: 37-42) are of the opinion that a strong base of factual knowledge is needed for thinking and problem-solving, but it is the way in which such knowledge is organized that make the difference between real understanding and just the reciting of facts. The research in this study relates especially to the approach to and the organization of knowledge to make it more accessible to the learner to construct his/her own understanding.

Research gives evidence that motivation to learn comes from a connection between attitude, how teaching is planned and practised, how learners approach their own learning and how assessment is planned for (Borich and Tombari, 2004: 32). Without learners' motivation to learn, the willingness to exert an effort towards the acquisition of complex knowledge and skills is unlikely.

Black and Wiliam (1998a: 139-148; 1998b: 7-74) conducted a study on the effect of classroom assessment practices on learner achievement; they examined 250 articles and chapters on the subject and concluded that summative assessment (standardized tests) are not designed to provide the immediate, contextualized feedback useful for helping teacher and learner during the learning process. The researcher is also of opinion that many assessment practices, in particularly traditional tests, true-false assessments, test facts and skills in isolation and the misunderstanding of the use of multiple choice questions do not necessarily offer the opportunity and motivation to learn. The researcher is furthermore of the opinion that standardized tests do not match the emerging content standards, and over-reliance on this type of assessment often leads to instruction that stresses basic knowledge and skills. Through this study the researcher therefore aims to investigate in what ways the application of a constructivist approach can structure authentic learning especially through formative assessment practices in order for learning to take place.

Through this study the researcher aims also to find ways to structure and to transfer knowledge in order to develop what Anderson and Krathwohl (2001: 42) call “deeper understanding” and what Erickson (2007: 38) explains as the shaping of a “conceptual mind”. The conceptual mind according to Erickson (2007: 38-45) is able to give relevance to the strategies and skills and results in a deep transferable understanding of the content and complexity of text.

Although extensive research is done on constructivism as learning theory, the researcher couldn't find research on the relationship between constructivism as an approach to instructional design and assessment practices as an integral part of the teaching-learning practice. Research on how a constructivist approach can positively influence motivation towards and knowledge on effective instructional design and assessment practice is also limited. Therefore the researcher finds it important to establish how knowledge and application of constructive teaching and learning will impact on instructional design and assessment practice. The undertaking of this study is to establish how especially the constructivist approach to instructional design and assessment practices can guide the teacher to find effective ways to plan, teach and to find the most appropriate purpose for assessment in order for effective learning to take place. For this reason the statement of the research as described below, is of the utmost significance.

### **1.3 STATEMENT OF THE RESEARCH PROBLEM**

Fox and Bayat (2007: 13) explain that the research problem narrows down the general interest in a research topic and focus on a specific research problem that is small enough to be investigated – this process leads to posing research questions. McMillan and Schumacher (2006: 51-53) agree that asking questions about educational practices constitutes the initial steps in research and implies the possibility of empirical investigation. A specific statement of the problem enables the researcher to communicate the research problem to others and guide the research process by indicating for example how and by what methods data will be collected (Johnson and Christensen, 2000: 47). Therefore the researcher finds it necessary to formally state the research problem in question form to initiate such an evidence-based inquiry.

One main problem statement and four (4) sub-problems are formulated for the purpose of this research. The main problem and sub-problems envisage the outcomes of this study and the researcher is of opinion that these will keep the focus on what the study intends to accomplish.

The main research problem can be stated as:

In what ways can the application of a constructivist approach bring about changes in instructional design and assessment practice and result in more effective teaching, learning and assessment?

The sub-problems that emerge from the above main problem are:

1. How does the view of the learner, an approach to learning or theory of learning influence instructional design and assessment practice?
2. In what ways can the knowledge and application of a constructivist approach lead to improved motivation in the teaching-learning situation?
3. How can particular instructional design efforts support effective assessment?
4. What is the impact of constructive feedback on teaching, learning and assessment?
5. How can a constructivist approach to teaching and learning be applied to result in effective instructional design (planning/teaching) and assessment practice?

The researcher concurs with McMillan and Schumacher (2006: 53) that sub-research problems in qualitative research provide the framework to report on research findings and conclusions based on a specific study.

#### **1.4 AIMS OF THE RESEARCH**

For Schuttleworth (2008) the ultimate aim of research is to generate measurable and testable data in order for the researcher to add to the accumulation of human knowledge. The researcher wants to further narrow down the description to the knowledge of a particular subject field and therefore agrees with McMillan and Schumacher (2006: 12) that the aims of research should be stated clearly, succinctly and be focused on a particular field of study. The aims of the study have to include the practical and theoretical values which warrant the study and may also increase the probability of adding to existing knowledge.

The main aim of this study will be *to explore and find ways how the application of a constructivist approach in instructional design and assessment practice can result in more effective teaching, learning and assessment.*

In order to achieve this aim the following sub-aims will be pursued:

- Exploration of different approaches to learning and views on the cognitive development of the learner
- Investigation of views on instructional design and the theoretical framework in which instructional design is done
- Identification of particular teaching strategies for a constructivist framework
- Exploration of the role of motivation in teaching, learning and assessment practices
- Investigation of the purposes and application of assessment
- Determination of the impact of constructive feedback on the teaching and assessment process
- Presentation of a conceptual model to illustrate how a constructivist understanding and the application thereof may improve quality in instructional design and efficacy in assessment practice (*see Appendix H: Constructive model for instructional design and assessment practice*).

The researcher is of opinion that a clear understanding of the principal concepts (terms and notions) to be utilised in this study is of importance for each reader of the research findings and data. It is for that reason that in each case the specific meaning of the concept for the purpose of this study will be emphasized and described.

## **1.5 EXPLANATION OF RELEVANT CONCEPTS**

Fox and Bayat (2007: 6) describe a concept as “*a collective used to label certain bits of experience conceived by the mind*” – in other words it is an elementary construct by which reality can be classified and categorized. Therefore, reference to particular concepts (perceived notions) included in a study, structure thought and provide a clear outline of the research. Concepts can be perceived differently by different people in different contexts and subject fields, used for different purposes.

The following relevant concepts will now be briefly described in this section, but a detailed discussion will follow in *Chapter 2 and Chapter 3*:

- Learning, approaches to learning and a constructivist approach to learning (*see Chapter 2, paragraphs 2.2 – 2.5*)
- Teaching, teaching strategies such as scaffolding, simulation, role play and discussion (*see Chapter 3, paragraph 3.3 and 3.4*)
- Instructional design (*see Chapter 3, paragraph 3.2*)
- Taxonomy (*see Chapter 3, paragraph 3.5*)
- Assessment practice and the purpose of assessment (*see Chapter 3, paragraph 3.6*)

The impact of a constructivist approach to learning, planning, the choices of teaching strategies and assessment form part of the interpretation and analysis of the research data to be gathered in the three stages of the data collection, which will be discussed in *Chapter 5*.

### **1.5.1 Learning**

Spady (2001: 18) defines “learning” as a change in understanding and behaviour that results from encountering new experiences, whereas Lovat and Smith (2003: 71) emphasise that learners’ experience can be directly linked to changes in understanding and behaviour which of course result in learning. Killen (2007: 3) cites the Cambourne (1988) definition that learning can be described as a process that involves making connections, identifying patterns and organising previous unrelated bits of knowledge, behaviour and action into new patterned wholes.

The researcher concurs with the opinions of the above-mentioned authors and their views on what learning is, but finds it necessary to elaborate on the definitions of Lovat and Smith (2003: 71), Killen (2007: 3) and Spady (2001: 18) by emphasising that learning involves a change in *own understanding and finding own meaning in the learning process which will result in learning*. It is therefore necessary that this research will concentrate on the impact of a constructivist approach on effective learning. This also links well with the idea of learning as change in *own* understanding and be able to transfer knowledge as proof of finding own meaning for the concepts.

### **1.5.2 An approach to learning**

An approach can be described as the orientation or thinking about how learning takes place as an inherently complex process. Du Plessis, Conley and Du Plessis (2007: 3) explain how understanding who the learner is, will also influence this orientation regarding how learning happens.

The three main orientations regarding learning, namely the behaviourist, cognitivist and constructivist approaches, will be discussed in *Chapter 2, paragraph 2.2* in order to find reasons for the focus on the constructivist approach in this study. Behaviourism focuses only on the objectively observable aspects of learning (*see Chapter 2, paragraph 2.2.1*); whereas a cognitive approach to learning (*see Chapter 2, paragraph 2.2.2*) looks beyond behaviour to explain brain-based learning interlinked with the idea of changes in the cognitive schema of the learner.

Wood (1998: 97, 98) compellingly explains the general principles regarding learning, namely that learning needs to start with the learner's existing knowledge, involve the learner through the learning process, keep the social aspect of learning in mind and include a metacognitive element to bring the learner to understanding his/her own learning. For these reasons the researcher will focus in the discussion on a constructivist approach to learning which closely relates to the ideas mentioned above and especially because a process is portrayed whereby the learner actively constructs or builds new ideas or concepts.

In *Chapter 3* the focus will be on how the constructivist approach impacts on instructional design and assessment practices.

### **1.5.3 A constructivist approach to learning**

Borich and Tombari (2004: 7) describe constructivism as an approach to learning in which learners are provided with the *opportunity to construct their own sense of what is being*



*learned by building internal connections* or relationships among the ideas and facts being taught.

The researcher finds “constructivism” to be the term assigned to a set of theories about learning which fall somewhere between the cognitive and humanistic views. Constructivism (particularly in its "social" form) suggests that the learner is much more actively involved in a collaborative effort with the educator to create ("construct") new meanings and understanding.

For the purpose of this study the researcher will include the constructivism views held by the following theorists:

- **Piaget as an example of "cognitive constructivism"** (*see Chapter 2, paragraph 2.4*), which is about how the individual learner understands things, in terms of *developmental stages, process of thinking and learning styles* (Killen, 2007: 8-9, Nieman and Monyai, 2006: 4; Du Toit, 2000: 65-66); and *Bruner's view* of cognitive development (Du Toit, 2000: 66-69);
- **Bruner as an example of a link between cognitivism and constructivism** (*see Chapter 2, paragraph 2.3*) as he defines knowledge (cognitive structures) as a “model we construct to give meaning and structure to regularities in experience” (Bruner, 1962: 120); and
- **Vygotsky as an example of the view in social constructivism** (*see Chapter 2, paragraph 2.5*), which emphasises how meanings and understandings are based on social encounters as well as the views of **Feuerstein** (*see Chapter 2, paragraph 2.6*) regarding mediated learning to assist the learners to construct own understanding that will make sense to them in a social setting (Killen, 2007: 9, 10; Niemann and Monyai, 2006: 1-42; Borich and Tombari, 1997: 178; Powers-Collins, 1994: 4).

The ideas of the theorists and educationists will be used to substantiate why the focus in this study will be on the *constructivist approach*. World Bank research (World Bank, 2008: 43-44) points to the importance of prior knowledge and the influence of particular contexts on the teaching-learning situation. Therefore the researcher wants to emphasise the impact of a constructivist approach on teaching, learning and assessment by

acknowledging language, the cultural and social dimension of teaching and learning (*see Chapter 2, paragraph 2.5.1; 2.5.4; 2.7.4*) as well as the role of attitude, motivation and encouragement (*see Chapter 2, paragraph 2.2.1.3 and 2.7.3*).

In view of the focus on the learner in a constructivist approach, the concept of “learner-centredness” in the teaching-learning process needs to be introduced and briefly described. An in-depth discussion of learner-centredness in the learning process will follow in *Chapter 2*.

#### **1.5.4 Learner-centredness**

An approach which includes “learner-centredness” demands that the learner must be the focal point in the teaching-learning situation – whether it’s regarding choices of teaching strategies, teaching activities, practical implementation or the choice of contexts to connect with the learner’s experience. Rushton, Eitelgeorge and Zickafoose (2003: 18, 19) are of opinion that with the learner in the centre of the teaching-learning process, more responsibility is demanded of the learner in the choice of what to learn and how to learn. For the teacher this means that more learner direction is needed. This self-direction will prompt learners to better self-confidence and to engage more deeply with their learning.

It must then be understood that learner-centredness does not mean leaving the learner to his/her own devices, but rather to involve, guide and support the learner to find direction in the process of constructing knowledge and meaning to concepts. The research therefore also aims to pinpoint the relation between learner-centredness, the construction of own understanding and the role of constructivism especially in its social form (*see Chapter 2, paragraph 2.7 and Chapter 3, paragraph 3.2.3*) and the individual nature of the learner (*see Chapter 2, paragraph 2.7.1*).

#### **1.5.5 Teaching**

Hirst and Peters (1979: 78) describe “teaching” as the intention to bring about learning. Mellander (1993: 5) shares the opinion and adds that through teaching, suitable conditions are set for learning to take place. Nieman (2004: 5) takes this argument further in stating

that teaching cannot be confined to only the idea of instructing and demonstrating because learners must acquire certain knowledge which varies in content and concept. Learners should also acquire particular skills and attitudes and should understand how to apply knowledge in new contexts. This means that to apply meaningful learning and understanding, one has to internalise such knowledge, which only becomes evident in an effective teaching-learning process.

Egan (1998: 28) argues convincingly that “teaching” is to lay out a logical path that the mind of the developing learner can follow with maximum ease in order to ensure understanding. In other words, the true essence of teaching is to bring about authentic understanding in order to give learners the opportunity to determine their own sequence of activities or to discover and organise things for themselves in the learning process. It is therefore clear that in view of the way teaching and learning are intertwined, a study on instructional design should include the interrelationship between teaching and learning and be specific on how the choice of teaching strategy can influence the logical path that each learner can follow to construct his/her own meaning and understanding of content and concepts.

### **1.5.6 Teaching strategy**

Du Plessis, Conley and Du Plessis (2007: 28) describe a “strategy” as a broad plan of action for teaching and learning activities which is used in order to achieve specific outcomes. It seems that the choice of strategies and the way those are systematically integrated impact on the teaching outcome and can lead to substantial improvements in learning.

From the constructivist perspective, learners should construct their own knowledge, irrespective of how they are taught. Even in the case of direct teaching (“telling”), learners cannot absorb an idea exactly as it is taught, but must *interpret* it and give meaning to what the teacher says *in terms of their existing knowledge*. So they are *constructing* their knowledge (Cobb, Yackel and Wood, 1992: 25-33).

Scaffolding, simulation, role play and discussion will be discussed in more detail as teaching strategies in *Chapter 3, paragraph 3.4*.

The choice of teaching strategies impacts greatly on the effectiveness of the instructional design, therefore it is necessary to know what an instructional design entails to realize what impact the teaching strategies will have on the total process.

### **1.5.7 Instructional design**

The concept of instructional design can be described as the process to identify the most applicable strategy, design or instruction plan to create an effective teaching-learning situation. Instructional design may also include the analysis of learning needs and systematic development of learning materials. The practice involves the planning and arrangement of content in such a manner that knowledge transfer (learning) can happen most effectively (Van Merriënboer, 1997: 2, 3). For this reason it is necessary for the designer to determine the current level of learner understanding, defining the final outcome (end goal) of the teaching process (instruction), and creating some assistance in the process of understanding. Instructional design focuses on outcomes, accounting for a multi-cultured, multi-lingual, multi-faceted context that can only be predictive. It further acknowledges that given the variability in human capability, a guarantee of reliable learning outcomes is improbable.

Already in the 1980s Reigeluth (1983: 5) explained that the nature of what is to be learned, the nature of the learner (prior knowledge, learning styles etc) and the nature of the learning environment should be taken into consideration in planning teaching or designing instruction.

Instructional design can also be thought of as a process to ensure the quality of teaching because it is based on the theory of learning, i.e. how learning is taking place.

### **1.5.8 Assessment practice**

According to the research done by the World Bank (2008: 3), the term “assessment” refers to all instruments applied to measure learners’ achievements. The assessment practice refers to the particular teaching-learning situation where assessment of learning may be evaluated through norm-referenced and criterion-referenced formal examinations, continuous assessment practices or any informal observation.

In this study the assessment practice refers to the practical situation where the teacher makes use of assessment for a particular purpose and to foster learning.

### **1.5.9 Purpose of assessment**

Armitage and Renwick (2008: 5, 20, 30, 31) as well as Du Plessis, Conley and Du Plessis (2007: 68-71) contend that to decide on a particular purpose will not only give direction in the assessment process, but will also assist the teacher in the process to adapt instructional design and review teaching planning.

While the most common assessment purposes according to Borich and Tombari (2004: 1, 43, 44) are to grade, sort, promote, select or merely evaluate, this study will focus on constructive planning for assessment which would most promote the diagnostic characteristics of assessment, with reference to assessment for guidance and motivation and especially to use assessment to foster learning.

References to the purposes for assessment will therefore include the ideas on seeking information about learner performance before instruction by making informal observations and asking questions, but also to determine the potential source of a learning problem in order to give guidance on how to improve and to provide feedback as “feed forward” to initiate deeper understanding. A further discussion of these purposes will follow in *Chapter 3*. The purpose of and for assessment relates to the understanding and the use of a taxonomy in the sense that a taxonomy can be used to plan teaching, direct the teaching practice and assessment in order for effective teaching and learning to take place.

### **1.5.10 Taxonomy**

Borich and Tombari (2004: 47) describe a taxonomy as a hierarchical sequence of obtainable, observable skills. In practice this means that a taxonomy may guide the set of teaching and learning outcomes and assessment criteria can therefore be used to identify the outcomes of classroom instruction.

In the 1950's Bloom, an American psychologist, and his colleagues developed three taxonomies, namely a cognitive, an affective and a psychomotor taxonomy as discussed in the 1956 version of the *Taxonomy of Educational Objectives: Handbook I: Cognitive Domain*. The most famous of these endeavors was the cognitive taxonomy, officially entitled the *Taxonomy of Objectives in the Cognitive Domain*.

The study will include the impact of the original Bloom taxonomy, the revised version by Anderson and Krathwohl (2001: 68-80) as well as that of the affective domain. There will also be a reference in *Chapter 3* to the learning hierarchies of Gagné (1985) and the work of Harrow (1972) and others in the creation of taxonomies as tool to analyse levels of cognitive thinking.

The effective use of a taxonomy in the planning of teaching and assessment will follow the theoretical description of the various examples of taxonomies.

### **1.5.11 Attitude and motivation**

According to Gagné (1985: 219) a valuable definition which has withstood the test of time is that of Allport, namely that “attitude is a mental and neural state of readiness, organised through experience, exerting a directive or dynamic influence upon an individual's response to all objects and situations with which it is related”. According to the Complete Wordfinder (Reader's Digest, 1993: 87) an attitude “depicts a settled opinion or way of thinking, a point of view towards, an inclination, tendency and even an orientation”. Many a wise man is of opinion that it is attitude which can alter thoughts, life and destiny. John C. Maxwell is determined in his book “Power of Attitude” (2001) that it is your attitude, not your aptitude that will determine your altitude. It is therefore clear that the attitude will

determine the will (motivation) to act and react. A positive attitude will imply motivation to act positively, because what and how much is learned is influenced by the learner's motivation to act. Motivation to learn, in turn, is influenced by the individual's emotional states, beliefs, interests and goals, and habits of thinking.

Gagné (1985: 219) claims that “attitude” has much to do with an individual's choices of personal action or so-called response tendencies. What the link between attitude and motivation means for this research is to investigate what the impact of the teacher's attitude in choices of teaching strategies is and the influence the way a teacher will plan the assessment process will have on the teaching-learning process. The study also attempts to find how the knowledge of planning and how to work in a constructive way, will lead to a more positive attitude towards the integrated teaching-learning-assessment process, because effective planning has much to do with the way one feels and thinks about an object. For this reason, the cognitive, affective and behavioural component of attitude will feature in the investigation.

## **1.6 RESEARCH DESIGN**

Nieuwenhuis (2007: 70) describes a research design as a plan or strategy which moves from the underlying philosophical assumptions to specifying the selection of participants, the data gathering techniques to be used and the data analysis to be done. A qualitative research design is a method of experimentation used by researchers studying human behaviour and habits. Qualitative research is often regarded as a precursor to quantitative research, in that it is often used to generate possible leads and ideas which can be used to formulate a realistic and testable statement of the problem (Schuttleworth, 2008).

In this particular study a qualitative research design will be used to gain information about the constructivist approach and its impact on instructional design and assessment practices. Qualitative research appears to be most applicable in this investigation because the researcher will primarily follow an inductive approach to data analysis which refers to moving from specific observations to broader generalizations and theories. A qualitative research design allows the researcher to remain receptive to new ideas, issues and

undercurrents emerging from the study and also acknowledges “words”, “feelings” and “experiences” as core issues in the data collection.

According to McMillan and Schumacher (2006: 315), qualitative research is based on a constructivist philosophy that assumes that reality is a multilayer, interactive, shared social experience that is interpreted by individuals. Reality is a social construction, which means that people ascribe particular meaning to concepts, objects or processes. People therefore form constructions to make sense of the world and reorganize these constructions as viewpoints, perceptions or belief systems. This means that people’s perceptions are what they consider to be real; these perceptions will direct their actions, thoughts, feelings and ideas. One of the greatest strengths of the qualitative approach is the richness and depth of explorations and descriptions which are possible through observation, interviews and discussions.

The aim of undertaking qualitative research is to understand and describe a phenomenon, develop meaning from the subject’s perspective and therefore words are used in analyzing and interpreting results. According to Cohen, Manion and Morrison (2002: 272) a qualitative approach is open-ended, continuous and responsive. Subjective facts opened for interpretation can be gathered and for this reason qualitative research is really illuminating. It is possible to understand why the participants would “say what they say”. Although qualitative research is not very pre-planned and is less formal, some fine detail emerges once the researcher is *in situ* (Cohen, Manion and Morrison, 2002: 273). Patton (2002: 14, 39-41) supports the notion of a researcher’s involvement and immersion in the research especially because he views the researcher “as instrument”.

It appears that the research design will thus be flexible, develop as the research progresses and will be holistic to include the relationship between concepts, influencing contexts and personal views. The flexibility of the qualitative techniques, which include communication and data collection, will guide the researcher’s interpretation to find general trends. It is a lot more open to personal opinion and judgement, and make observations rather than only giving results which ensure that useful data is always generated (Patton, 2002: 39).



A detailed description of the qualitative research design applied in this study will follow in *Chapter 4, paragraph 4.2.1.*

### **1.6.1 Literature review**

The aim of a literature review is to illuminate the related literature on the research problem (McMillan and Schumacher, 2006: 75). This does not refer to a summary of ideas, or a descriptive list of the material available, but that the writer-researcher has studied existing work in the field with insight and did a critical analysis and review of the work. Different sources reiterate the importance of the literature study in research (Fox and Bayat, 2007: 14; McMillan and Schumacher, 2006: 75-76; Mouton, 2004: 86-87). Mostly it serves the purpose of defining and limiting the research problem and gaining an understanding of the current knowledge on the topic, to place the study in a historical perspective, evaluate promising research methods and relate findings to previous knowledge and suggest further research. The literature study helps in the clarification of the content (what is investigated) and the reasons for the investigation, i.e. why this investigation is necessary (Johnson and Christensen, 2000: 40-44). The review should give an idea of the work that has been carried out in the subject area, preparing the reader for the study that is to follow.

As can be seen from the purposes above, the literature review is an exploration of an area, which at best will provide definition and a framework for research. Therefore a good literature review raises questions and identifies areas to be explored and will highlight the relationship of previous research to this particular study. It seems that this relationship between past work and the rationale of the research to be done is the most important influence on the structure and length of the literature review. It is also necessary to keep the purpose in mind, because it will help to focus and direct the research effort.

Johnson and Christensen (2000: 41) mention that another purpose of the literature review is to convey to the reader what knowledge and ideas have been established on a topic, in order for the researcher to comment on the strengths and weaknesses and argue for further investigation in a particular field.

Besides enlarging knowledge about the topic, conducting a literature study enables the researcher to gain and demonstrate the ability to scan the literature efficiently, using manual or computerized methods, to identify a set of useful articles and books as well as the ability to apply principles of analysis to identify relatively unbiased and valid studies.

In *Chapter 2*, approaches to learning (theories) and views of the learner, and in *Chapter 3* approaches to instructional design and assessment practice are discussed. In *Chapter 3* the emphasis will be on constructivist ideas on instructional design and assessment practice.

## **1.6.2 Research methods**

Bogdan and Biklen (1992: 223) point out that a research method frames the mind to deal with a particular perspective toward objects and activities. The choice of a particular research method ensures that the collection of information will be systematic, and any interpretations made have a proper regard for satisfying some truth claims. Nieuwenhuis (2007: 70) contends that the method(s) and design(s) which a researcher chooses in an investigation, should be congruent with the philosophical assumptions and be the most appropriate for the kind of data required to answer the research question(s) posed.

The empirical research in this study will involve the perspectives, attitudes and feelings of people. Action research approached from a qualitative perspective will be most appropriate to provide answers to the research questions related to this study. Action research in the form of focus group interviews as well as a whole group discussion based on open questions posed to the participants will therefore serve as the operational framework in which the investigation will be done.

### **1.6.2.1 Action research**

As early as 1953, Corey (1953: 6) argues that action research is a process in which practitioners study problems scientifically so that they can evaluate, improve and steer decision-making and practice. The reason for utilising action research in this study is to evaluate the current understanding of instructional design and assessment practices and to establish how a constructivist approach will impact on such an understanding.

De Vos and Fouche (2000: 80-81) mention that *action research* aim to make the research more humanistic and relevant. In following Nieuwenhuis (2007: 70) action research is interpreted to be appropriate in this study because the researcher will focus on the behaviour (and feelings) expressed and the meaning and interpretations that the participants give to the teaching-learning situation. Data will also be collected by means of participant observation and focus group interviewing (discussions) and therefore an inductive form of reasoning will be used (Poggenpoel, 2000: 336). The researcher will attempt to come to a systematic explanation of the manner in which the constructivist approach may add value to the structure of knowledge, the transfer thereof and the assessment of such knowledge. Such findings will substantiate the suggested conceptual framework.

Schurink (2000: 248) emphasizes that gathering information on a qualitative base in which theory and practice are integrated, the research can enhance the professional practice and in turn professional practice informs and develops professional theory. This idea underlines the view that, in practice participants close to the core focus of research, will provide the most valuable information to serve the purpose of action research in particular. A further discussion on action research will follow in *Chapter 4, paragraph 4.2.2*.

Prolonged and persistent fieldwork was conducted to allow interim data analysis and corroboration to ensure that findings match the participants' reality.

### **1.6.2.2 Focus group discussions**

It was mentioned in the previous *paragraph* that focus groups as a form of group interviews were utilized in the introductory stage of the study. Nieuwenhuis (2007: 90) is of opinion that using focus groups as a strategy to do group interviews is based on the assumption that group interaction will be productive in widening the range of responses and releasing inhibitions that may otherwise discourage participants from disclosing information. Cohen, Manion and Morrison (2002: 288) support this idea by explaining that data emerged from the interaction of the group gives insight in feelings and experiences at large and will possibly produce rich detail which will not be possible to obtain by using other research methods. The group in the present study was encouraged to

reflect on their experience of instructional design, planning and their understanding of assessment.

### **1.6.2.3 Open questions**

Open questions give the participant the opportunity to write any answer in an open space. The open question has advantages especially when a variable is relatively unexplored or unknown to the researcher. In such a case the open questions will enable the researcher to explore the variable better and to obtain some idea of the range of possible responses. Information obtained in this manner can be used for different purposes (Fouche, 2000: 158).

For the purpose of this study the open questions were concept-based and were used after the participants completed a course on approaches in teaching and learning, which included content on constructivism as an approach and the possible teaching strategies linked to constructivist ideas.

### **1.6.2.4 Research project**

A research project is usually associated with research conducted over a lengthy period of time and involves an investigation into a particular field of study or concerning a particular concept. It is unusual to include a research project as a final stage in empirical study, but as McMillan and Schumacher (2006: xiii) admit that as educational research has become more diverse and therefore uses different “lenses” to gain a deeper understanding and knowledge of participants and their perspectives, the inclusion of more and other methods becomes necessary. Golafshani (2003: 603) refers to such involvement of different data sources with the possibility of multiple perceptions as “the triangulation effect”.

The aim in the present study is to investigate the impact and use of a constructivist approach in instructional design and assessment practice. It is therefore appropriate to also include a constructivist paradigm in the research process. According to Golafshani (2003: 603, 604), the constructivist paradigm in qualitative research views knowledge as socially constructed and admits that it may change depending on the circumstances.

Constructivism values multiple realities. Consequently, to acquire valid and reliable multiple and diverse realities, multiple methods of searching and gathering data are in order.

The inclusion of a research project over and above the use of focus group interviews, open questions in whole group discussion and feedback from tutors, links to the open-ended perspective in constructivism, which also adheres to the notion of data triangulation by allowing participants to play an active role in the data collection. Engaging a research project in the investigation which comprises an exam equivalent on planning and conducting classroom assessment as well as formative feedback as final stage of the empirical investigation, may lead to more valid, reliable and diverse construction of realities.

Creswell and Miller (2000: 116) define triangulation as “a validity procedure where researchers search convergence among multiple and different sources of information to form themes or categories in a study”. Keeping the “validity procedure” of triangulation in mind, the inclusion of the research project will be most applicable. Triangulation will in this instance assist to conclude how the participants’ knowledge of constructivism, application of theoretical frameworks, them conducting assessment and the use of feedback, changed from their first engagement with a constructivist approach to applied theory in a practical situation.

### **1.6.3 Sampling**

A *sample* for a study can be defined as a selected finite set of persons, objects or things that researchers involve in their studies which form actually a subset of elements of the population (Hackley, 2003: 25). Fox and Bayat (2007: 54) describe a sample as any subset that is obtained of the elements of the population to be studied.

Uys and Puttergill (2003: 107, 108) explain that *sampling* is the process of selecting a part of a group under study and to choose a sample is one way to optimise the use of resources in a research design.

The literature reveals that the sample should serve as a rich source of information to find the most appropriate data for the purpose of the research. For this reason the researcher decided on a purposive sampling of participants involved in the particular course and institution where the impact of knowledge and application of the Constructivist approach be quite readily detected. Uys and Puttergill (2003: 113) explain the worth of purposive sampling to be that direct experience, attitudes and specific situations can be researched. They indicate further that a purposive sample is used to identify specific cases for deep analysis, which was indeed the case in this particular study.

McMillan and Schumacher (2006: 322) explain that the size of the sample should be related to the purpose, the research problem, the major data collection strategy and the availability of information-rich cases. They further argue that the researcher can determine the sample size by looking also at the focus of the study and the availability of the informants. In this regard Fox and Bayat (2007: 61) clearly indicate that the size of the samples will depend on a variety of practical considerations, but that the samples should represent the population to result in more reliable and accurate findings. Accordingly, all students registered for the particular study were included as participants in the study. This served as a good representation of teachers who become knowledgeable regarding constructivism as an approach to teaching and learning and the impact on their instructional planning and assessment practices.

Having briefly outlined the research design, the division of the material into chapters for this study will be discussed in the rest of this chapter.

## **1.7 DIVISION INTO CHAPTERS**

The six chapters comprising this thesis are briefly outlined in this section.

*Chapter 1* comprises an introductory orientation to explore the nature and extent of the investigation. The primary aim of the research as well as some sub-aims which are linked to the problem, are explained. Some clarification of concepts further defines the research problem.

It is necessary to discuss the research paradigm in some detail as well. The discussion includes the reasons why qualitative research is applicable to this particular investigation. The point of departure, selection of participants, data collection techniques, analysis and ethical considerations also forms part of *Chapter 1*. The purpose of this chapter is therefore to place the study in perspective and familiarise the reader with the subject matter.

The rest of the chapters in the thesis will be introduced with a short reference to the content of each.

*Chapter 2* of this study is a literature review on approaches to learning (learning theories) with special reference to behaviourism, cognitivism and constructivism. In this chapter there will be special reference to the views and ideas of Skinner, Piaget, Vygotsky, Bruner and Feuerstein on how learners learn. This literature review will serve as an explanation why the researcher decided to focus on the impact of constructivism on instructional design and assessment practice. The theoretical background serves also as verification for the discussion which follows in *Chapter 3*.

*Chapter 3* comprises a literature study on teaching and assessment practices. The main aim of this chapter is to investigate a constructivist approach to instructional design and assessment practices with special reference to assessment for the purpose of learning.

*Chapter 4* concerns the empirical investigation. The discussion will include the research methods, sampling and the description of the measuring instruments used in the investigation.

The findings of the literature study as well as the empirical investigation will be reported on in *Chapter 5*.

Finally, in *Chapter 6* the implications of the research will be discussed and, with specific reference to an instructional design and assessment model, particular recommendations for further research considered.

## **1.8 CONCLUSION**

This first chapter has been necessary for orientating, setting and retaining the focus of the research on a constructivist approach in instructional design and assessment practice. Therefore this chapter not only introduces the thesis but also explains the main argument, some concepts to be dealt with in the study as well as its research methodology and structure. The chapter also includes the reference to approaches and learning theories and the relevance of such mentioned to this particular qualitative investigation. Only a very brief explanation of the concepts chosen for this research appears in this chapter, since a comprehensive discussion will follow in *Chapters 2 and 3*.



## **2. CHAPTER 2: APPROACHES TO LEARNING AND VIEWS OF THE LEARNER**

### **2.1 INTRODUCTION**

In *Chapter 1* the main aim of this research was stated to be to investigate a constructivist approach to instructional design and assessment practice. The question can be asked: “*Why a constructivist approach to instructional design and assessment practice?*” This second chapter is aimed at providing answers to the question and will therefore comprise a literature study of different theories of learning.

It will become evident from this research that “change” is embedded in all learning theories, but that the differences attached to the “change” is what makes a particular approach more suitable in this study than others.

The intent of the study is not to become deeply involved in debates about and comparisons of views about learning as such, but to use the information found to model why a constructivist approach can enhance instructional design and improve efficacy in the assessment practice.

In this chapter the researcher will provide an overview of the behaviourist, cognitivist and constructivist approaches with special reference to the ideas of Skinner, Bruner, Piaget, Vygotsky and Feuerstein.

### **2.2 APPROACHES TO LEARNING**

For the sake of this study, the researcher will focus on behaviourism and cognitivism as described in *Table 2.1* and add constructivism as the third main category or philosophical framework. A discussion of the key characteristics of these three approaches will follow in justifying why the researcher focused on a constructivist approach to instructional design and assessment practice.

**Table 2.1: A summary of the four orientations to learning**

<i>Approach</i>	<i>Behaviourist</i>	<i>Cognitivist</i>	<i>Humanist</i>	<i>Social and situational</i>
<b>Learning theorists</b>	Thorndike, Pavlov, Watson, Guthrie, Hull, Tolman, Skinner	Koffka, Kohler, Lewin, Piaget, Ausubel, Bruner, Gagné	Maslow, Rogers	Bandura, Lave and Wenger, Salomon
<b>View of the learning process</b>	Change in behaviour	Internal mental process (including insight, information processing, memory, perception)	A personal act to fulfil potential.	Interaction/observation in social contexts. Movement from the periphery to the centre of a community of practice
<b>Focus of learning</b>	Stimuli in external environment	Internal cognitive structuring	Affective and cognitive needs	Learning is in relationship between people and environment
<b>Purpose in education</b>	Produce behavioural change in desired direction	Develop capacity and skills to learn better	Become self-actualized, autonomous	Full participation in communities of practice and utilization of resources
<b>Educator's role</b>	Arranges environment to elicit desired response	Structures content of learning activity	Facilitates development of the whole person	Works to establish communities of practice in which conversation and participation can occur.
<b>Manifestations in learning</b>	Behavioural objectives Competency - based education Skill development and training	Cognitive development Intelligence, learning and memory as function of age Learning how to learn	Andragogy Self-directed learning	Socialization Social participation Associationalism Conversation

Adapted from: Merriam, S. B., and Caffarella, R. S. 1999. *Learning in Adulthood*. San Francisco: Jossey-Bass: p 138

*Table 2.1* indicates that behaviourism treats the learner as an “organism” and “acting entity”, on the other hand the cognitivist thoughts emphasise the importance of the *mind* in making sense of the material which it is presented. Nevertheless, it still presupposes that the role of the learner is primarily *to assimilate whatever the educator presents*. Humanism includes the affective aspect in the learning process and the social and situational approach emphasis that learning is happening in a social context.

In all the theories referred to in *Table 2.1*, it is clear that learning is a process which can result in behavioural, cognitive and social change, but there is no mention of any *own meaning and understanding established in the learner*.

It is important in this study to investigate further and in greater depth how learning takes place according to behaviourism, cognitivism and constructivism in order to find evidence justifying the focus on constructivism as approach of choice in instructional design and assessment practice.

### **2.2.1 Behaviourism**

Higgs and Smith (1997: 81–88) claim that behaviourism originated in work done in the natural sciences. It was one of the most influential theories in education in the 20th century. According to Jerling (1996: 108), supporters of behaviourism use detailed and accurate research to formulate principles to explain and predict relationships between *stimuli* (the way in which behaviour is evoked), *behaviour* (observable actions which are probably carried out in reaction to stimuli) and the *consequent conditions* (reward or punishment for action). Behaviourism disregards any notion that there may be an internal component to man’s learning, but emphasises external environmental influences on specific, observable and measurable human behaviour. According to the behaviourists, people are solely physical beings, and the intellect is merely a highly developed “computer” which reacts to inputs with specific behaviour as output. The hypothesis behind behaviourist learning theories is that all learning occurs when behaviour is influenced and changed by external factors (Merriam and Caffarella, 1999: 251-253). In other words, the “input” that people receive should be changed in order for learning to take place. Merriam and Caffarella (1999: 251) refer to Grippin and Peters’ (1984) explanation that *contiguity*

and *reinforcement* are central to explaining the learning process in regard to an individual's subjugation to external stimulus as a determinant of response (i.e., behaviour). Contiguity is understood as the timing of events that is necessary to bring about behavioural change, while reinforcement refers to the probability that repeated positive or negative events will produce an anticipated change in behaviour (Merriam and Caffarella, 1999: 249-253).

As shown by the Pavlov dogs, conditioning may result in a change in behaviour, but the change may not involve drawing upon experience *to generate new knowledge* as described by Gagné (1985: 24, 25). The *depth or nature of the changes* involved is likely to be different.

As an example of how different the ideas are regarding what learning is, the research of Säljö (1979) regarding perceptions of learning indicated 30 years ago already that different categories of perceptions of learning could be distinguished. During the research a number of adult learners were asked what they understood by learning. Their responses fell into the following five main categories:

- Conception 1: Learning as a quantitative increase in knowledge. Learning is acquiring information or “knowing a lot”.
- Conception 2: Learning as memorising. Learning is storing information that can be reproduced.
- Conception 3: Learning as acquiring facts, skills, and methods that can be retained and used as necessary.
- Conception 4: Learning as making sense or abstracting meaning. Learning involves relating parts of the subject matter to each other and to the real world.
- Conception 5: Learning as interpreting and understanding reality in a different way. Learning involves comprehending the world by reinterpreting knowledge (quoted in Ramsden, 1992: 26).

In the five categories that Säljö identified it is clear that learning appears to be a process – there is a concern with what happens when the learning takes place. Ramsden (1992: 27-28) comments that conceptions 1 to 3 imply a less complex view of learning, namely that

learning is something external to the learner; whereas conceptions 4 and 5 are qualitatively different from the first three. The last two conceptions look to the “internal” or personal aspect of learning. Learning is seen as something that a person *does in order to understand the real world*. Not surprisingly then that many theorists have therefore been less concerned with overt behaviour but with changes in the ways in which people “understand, or experience, or conceptualize the world around them” (Ramsden, 1992: 4).

Questions are still asked about whether a person (learner) needs “performing” (acting and reacting) in order for learning to have happened, which factors may cause behaviour to change and whether the change involved can include the potential for change. Questions like these have led to the qualification of the changes.

This particular view will be investigated in relation to the understanding of constructivism as portrayed in *paragraph 2.7*.

In this way, learning could be thought of as “a process by which *behaviour changes* as a result of experience” (Merriam and Caffarella, 1991: 124). One of the significant questions that arises is to what extent learners are really conscious of what is going on. Are they aware that they are engaged in learning – and what significance does it have if they are?

### **2.2.1.1 Skinner and behaviourism**

Skinner’s version of behaviourism and especially his ideas about *operant learning* (also called instrumental learning) had the greatest influence on the development of school curricula and educational theory in general (Gagné, 1985: 29, 30). This view emphasizes the precise skilled nature of the responses involved and implies that the learned connection is instrumental in satisfying some motive.

Skinner believed that an organism (person/learner) continuously interacts with its environment. Three elements typify this interaction, namely -

- a stimulus that causes the behaviour;
- the behaviour itself (also called the response); and

- the reinforcement of the behaviour.

According to this theory, learning takes place if a person responds satisfactorily to a specific stimulus. In the teaching-learning environment it seems that when learners are stimulated, they will try out a number of response patterns, and if a response (behaviour) “works” or achieves success, it will be repeated, while unsuccessful responses will be rejected. If the connection between a stimulus and a response is satisfactory, it will be positively reinforced, but if the connection is unsatisfactory, it will be negatively reinforced and the response will not be repeated. The moment a stimulus is connected to a response, an association is formed and thereafter the stimulus will always elicit that particular response. In this way learners are conditioned to react to certain stimuli. To ensure that learning takes place, the correct responses should be reinforced. Megginson, Joy-Matthews and Banfield (1993: 84) explain it as: “If human learning is based on the instrumental conditioning model, then much of its success or failure can be related to the way in which reinforcements are used to condition behaviour.”

Reinforcement can be negative or positive. Positive reinforcers reinforce behaviour, and this leads to the organism practicing the reinforced behaviour. Positive reinforcers can take the form of, for example, a reward, prize, compliments, approval, financial remuneration, or benefits. Negative reinforcers ensure that specific behaviour is avoided or discontinued. Negative reinforcers may take the form of punishment, disapproval or poor marks. By reinforcing the correct response, the chances are increased that the learner will repeat the correct response. The learner is thus conditioned to react in the correct way to learning stimuli from the environment (Gagné, 1985: 35).

Behaviourism highlights a crucial aspect of learning, namely “*behavioural change*”, therefore it appears that for the behaviourists, thought and feeling for instance have relatively little to do with learning. In other words, the focus for them, is gaining *knowledge or an ability through the use of experience*. Therefore learning is approached as an outcome or product of some processes and therefore can be recognized or seen.

### **2.2.1.2 Emphasising the setting of objectives**

As mentioned in *paragraph 2.2.1.1*, the basic aim of education according to the behaviourists is to change the way in which learners *behave*. Behaviourists therefore emphasise setting objectives that define the behaviour teachers want their learners to display. This behaviour should be measurable and therefore visible. People who believe in behaviourism and objectives contend that if education and learning can be organised according to a fixed schedule, educators will be able to predict and control what happens in the classroom. In the following example, given by Higgs and Smith (1997: 86), the way in which a behaviourist would get a learner to learn Mathematics is explained:

The behaviourist will start by defining exactly what she wants the child to do.

She would set an objective. It would be something like the following: “By the end of this lesson the learner will be able to pass a Mathematics test for grade 10 learners. The pass rate for this test is 60 per cent.” This objective is the desired behaviour. The behaviourist can tell the learners that those of them who pass the test will receive a reward (for example, they will be able to go home early or not have to do any homework for a week). The behaviourist would then present the Mathematics material to the learners. She would probably present it in a well-defined manner by working from stage one to the final stage. The learning material and the reward are the stimuli. At the end of the lesson, the behaviourist will test the learners. Any learners who receive 60 per cent will have passed the test. This means that the behaviourist can state that the learners have definitely learned the Mathematics material.

The above mentioned example is how conditioned learning, as viewed in behaviourism, will work in practice.

### **2.2.1.3 Motivation and behaviourism**

*The will to learn is the very heart of the learning process – Johnston, 1996: 27*

Cajkler and Addelman (2000: 2, 3) explain that learners can be motivated to learn by attractive, interesting and achievable outcomes; by being involved in the learning by *getting positive reinforcement*, by being encouraged and praised and by identifying the

learning problems of underachievers, rather than just by reprimanding them.

Behaviourism finds the reinforcement of good behaviour necessary to strengthen such behaviour, resulting in its occurring again. Reinforcement can take place through incentives like certificates and awards, social encouragement and praise and even consumable reinforcement by receiving a sweet or something similar as external motivation as also referred to in *paragraph 2.2.1.1*.

Gagné (1985: 28-35) argues that learners will be motivated to repeat a behaviour when they feel they can manage a task. Learning assignments should therefore be divided into smaller units to give learners enough time to complete the tasks successfully. The learner can be further motivated by practicing and repeating the newly mastered knowledge and skills regularly.

### **2.2.2 Cognitivism**

One of the most notable criticisms of behaviourism was Noam Chomsky's argument that language could not be acquired purely through conditioning, and must be at least partly explained by the existence of internal mental states (Chomsky, 1993, 1982 and 1968). Chomsky's 1959 review of B. F. Skinner's *Verbal Behaviour* challenged the behaviourist approaches to studies of behaviour and language dominant at the time and contributed to the cognitive revolution in psychology. As explained in the 1999-version of the *The Cambridge Dictionary of Philosophy* (p. 138), his naturalistic approach to the study of language has affected the philosophy of language and mind in general. Jerome Bruner (1915 -) supported the idea of the importance of language in the 1970s.

The criticisms of behaviourism and the new understanding of *mental functions* appear to have made cognitivism the dominant force in psychology in the late 20th century. The main issues that interest cognitive psychologists are the inner mechanisms of *human thought*, especially the *processes of knowing* as well as how people mentally represent information processing.



In the 1990s, various new theories emerged and challenged cognitivism and the idea that thought was best described as computation. Although the importance of language in learning was identified, the computational theory of mind still states that the mind functions as a symbolic operator. This means that language and mental structures are connected, but it does not mean that learning is taking place through language (*see paragraph 2.5.3*). In cognitivism, language is still part of a variety of thinking skills that include learning-to-learn skills, reasoning skills and problem-solving skills (Borich and Tombari, 2004: 302).

Cognitivism has been criticised in a number of ways. The most notable critics of cognitivism appear to have been Dreyfus and Heidegger. Dreyfus (1929 -) claimed that cognitivism ignores the *context* in which learning is taken place. Dreyfus argued in his 1979 book, *What Computers Can't Do: The Limits of Artificial Intelligence* that in intelligent behaviour, and for the importance of the overall situation for orderly behaviour, the “person” should be involved. Dreyfus also stresses the importance of specifically the “*Human needs as determinators of the situation*”, which is the *context* in which the interpretation of the world occurs (Dreyfus, 1991: 31-35).

*Heidegger* (1889 – 1976) called these “determinators of the situation” as “*being in the world*” (Heidegger, 1978: 25-26). In his book *What is Called Thinking?* (1968: 73), Heidegger agreed with phenomenologists and hermeneutic philosophers who argued that cognitivism represents experiences and mental functions as measurements (computation) and therefore found that a context-free psychology about how learning takes place is a contradiction in terms. His views also favoured aspects of holism; in the sense of a learning theory it means that the *whole self ought to be involved in the learning process*.

Based on the criticism of cognitivism as discussed above, Heidegger’s view that the process of learning should be seen holistically as an integrated process appears to be correct. Because this study attempts to find grounds for an integrated approach to teaching, learning and assessment, the focus will be on the constructivist approach in the discussion to follow.

### 2.2.3 A constructivist approach

Bransford, Brown and Cocking (2000: 219-222) describe constructivism as an epistemology (a philosophical framework or theory of learning) which holds that humans *construct meaning* from current knowledge structures. These arguments about the nature of human learning guide constructivist learning theories (as they were introduced in *Chapter1, paragraph 1.5.3*) and teaching methods or strategies (as they were introduced in *Chapter1, paragraph 1.5.6*).

The main proposition of constructivism to be explored in depth in this study is that learning means *construction, creating, inventing and developing own knowledge*. Shepard (1989: 5, 6) describes the process of creating understanding as learners' *constructions of their own cognitive maps of the interconnections among concepts and facts*. Learning in constructivist terms will be the process and result of questioning, interpreting and analysing information, but furthermore to be able to use the information to develop and alter meaning and understanding of concepts and ideas (Marlowe and Page, 2005: 7-10).

The following constructivist ideas about learning will feature in the discussions below on theorists' views regarding the construction of understanding and creating new knowledge:

- The learner has prior knowledge and therefore does not come to school or the classroom empty headed. Conceptual knowledge cannot be transferred ready-made and intact from one person (the teacher) to another person (the learner).
- A learner makes sense of a new situation by making use of existing own ideas, i.e. to make use of existing schemata; learning will modify/extend the schemata. Learning from this perspective entails that the learner must re-organise and re-structure his present knowledge structures, and this can only be done by the learner himself (Bransford, Brown and Cocking, 2000: 222). G.S. Hall pre-empted this notion as early as 1907:

All now agree that the mind can learn only what is related to other things learned before, and that we must start from the knowledge that the children really have and develop this as germs, otherwise we are . . . talking to the blind about colour. Alas

for the teacher who does not learn more from his children than he can ever hope to teach them! (Hall, 1907: 15-38)

- One must give a learner a chance to explain and to provide reasons for answers.
- Discussions and social structure are important because teaching and learning takes place in a cultural and socially linked environment (Borich and Tombari, 1997: 177). In this social process learners learn from each other (and the teacher) through discussion, communication and sharing ideas, by actively comparing different ideas, reflecting on their own thinking and trying to understand other people's thinking by negotiating a shared meaning (Cobb, Yackel and Wood, 1992: 3-31).
- Learners put thoughts in words – there is a very important link between language learning and understanding; therefore experience and learning are mediated through language (Nieman and Monyai, 2006: 34-39).

Constructivism as an approach has many variations, such as *active learning* (Piaget and Vygotsky), *discovery learning* (Bruner), and *knowledge building* (Feuerstein), but regardless of the variety, constructivism promotes a learner's free exploration within a given framework or structure to find his or her own meaning and understanding of concepts. In order to establish how the process of finding own meaning and understanding includes active involvement through discovery in order to build knowledge, the views of these theorists are discussed in more detail. The study also focuses on the role of language and the social setting of the teaching-learning environment and the impact on this process of constructing understanding.

### 2.3 JEROME SEYMOUR BRUNER (1915-)

*"To perceive is to categorize, to conceptualize is to categorize, to learn is to form categories, to make decisions is to categorize."*

*Jerome Seymour Bruner* (an American psychologist) has contributed to cognitive psychology and cognitive learning theory in educational psychology and to the general philosophy of education. Bruner's scientific rigour regarding unobservable mental processes made him instrumental in the move from



behaviourism to cognitivism in the mainstream psychology of the 1950s and 1960s. An important work in the early days of the cognitive movement was *A Study in Thinking* which Bruner published in 1956 with Jacqueline Goodnow and George Austin, and where they explain cognitive processes to be the means whereby organisms achieve, retain and transform information.

In this study, the researcher concentrates on the impact of Bruner's constructivist views, namely that learning is an *active process* in which learners *construct new ideas* or concepts based upon their current or past knowledge (Gravett, 2005: 19). Bruner can be viewed as the link between cognitivism and constructivism as he defines knowledge (cognitive structures) as a "*model we construct to give meaning and structure to regularities in experience*" (Bruner, 1962: 120). The world constantly evolves, and one must adapt to the changing environment through the process of learning. Acquiring and adapting knowledge serves the purpose of making sense of the world. Past conceptions, once adequate and appropriate for the learner's perceived reality, become replaced by original conceptions that better fit the present mould. Bruner states that "to understand something is to give up some other way of conceiving it" (*ibid.* 123).

Bruner views learning as a process through which the learner selects and transforms information, constructs hypotheses, and makes decisions, relying on a cognitive structure to do so. Cognitive structure (i.e., schema, mental models) provides meaning and organization to experiences and allows the individual to "go beyond the information given". Bruner felt that knowledge was best acquired when learners were allowed to discover it on their own (Milner, 1991: 464-467).

### **2.3.1 Bruner's "The Process of Education" (1960)**

Bruner's *The Process of Education* (1960: 11-16) discusses the process of learning among other things in terms of:

- **The role of structure in learning and how it may be made central in teaching.** Bruner viewed structure as the centre of transfer. He argued that it is only through structure that previous learning can render later learning easier. This means that

there must be a clear general picture of the relations between the previously learned and the content to be learned (Bruner, 1960: 12). It is clear from the research that to Bruner learning is finding meaning and not only to preserve facts. This indicates that Bruner views knowledge as a constructed entity, consistent with constructivism, with which Bruner is also closely associated. A constant theme in Bruner's work is that education is a *process of discovery*. Bruner advocated that if learners were allowed to pursue concepts on their own they would gain a better understanding. Within the education system, a teacher would then engage learners in *active dialogue and guide* them when necessary so that learners would progressively build their own knowledge base, rather than be "taught". New information would be classified and understood based on knowledge already gained.

- **Readiness for learning.** The hypothesis here is that any subject can be taught effectively in some intellectually honest form to any child at any stage of development, which means that the teacher has to focus on subject structure and assure that the content fits the level of learner ability (Bruner, 1960: 33). This notion underpins the idea of the *spiral curriculum*: "A curriculum as it develops should revisit these basic ideas repeatedly, building upon them until the learner has grasped the full formal apparatus that goes with them" (Bruner, 1960: 13). The instructor and learner should engage in an active dialog to translate information to be learned into a format appropriate to the learner's current state of understanding. Curriculum should be organized in a spiral manner so that the learner continually builds upon what he/she has already learned. This will also mean then that learners should be provided with study materials, activities, and tools that are matched to and capitalise on their developing cognitive capabilities. In this "staircase" continual process of learning, the environments (contexts) can slow down the sequence of learning or on the other hand may speed it up (Bruner, 1983: 133).
- **Motives for learning.** Bruner deems interest in the material to be learned rather than external goals as grades or later competitive advantage as the best stimulus to learning (Bruner, 1960: 14). In an age of increasing spectatorship, "motives for learning must be kept from going passive... they must be based as much as possible

upon the arousal of interest in what there is to be learned, and they must be kept broad and diverse in expression” (Bruner, 1960: 80).

Bruner argues in his book *Toward a Theory of Instruction* (1966) that the teacher should strive, as far as instructional design is concerned, to encourage learners to discover principles by themselves.

Bruner (1966) states that a theory of instruction should address the following four major aspects, namely the -

- predisposition towards learning;
- ways in which a body of knowledge can be *structured* so that it can be most readily grasped by the learner;
- most effective sequences in which to present material; and
- nature and pacing of rewards and punishments.

Bruner also argues that if materials are presented in an appropriate manner, children (learners) can be taught at any age. He therefore explains that good methods for structuring knowledge should result in simplifying, generating new propositions, and increasing the manipulation of information (Bruner, 1983: 135).

### **2.3.2 Bruner’s theory on instruction**

Bruner’s theory of instruction is based on how children (learners) *construct knowledge*, which involves three basic modes of representation: *enactive representation (action-based)*, *iconic representation (image-based)*, and *symbolic representation (language-based)*. Bruner's theory suggests it is efficacious when faced with new material to follow a progression from enactive to iconic to symbolic representation – this holds true even for adult learners. Bruner's work also suggests that a learner (even of a very young age) is capable of learning any material as long as the instruction is organized appropriately, in sharp contrast to the beliefs of Piaget and other stage theorists (Muir, 1990: 215).

Berliner and Gage (1998: 111) explain that in their very early years, young children rely extensively upon *enactive modes* to learn. As a child learns to roll over, sit up or walk,

they are learning to do so through their own actions. While this mode is present in people of all ages it is more dominant when a person is young. An example of this dominance is the way a young person can often learn to play a musical instrument more quickly than an older person.

*Iconic representation* normally becomes dominant during the next stage of childhood. Children learn to understand what pictures and diagrams are and how to do arithmetic using numbers and without counting objects.

Later – usually around adolescence – the *symbolic mode* of learning becomes most dominant. In this stage learners can understand and work with concepts that are abstract (Berliner and Gage, 1998: 111).

From Bruner's explanations it is evident that he views organised instruction as important in the constructing of knowledge and the mastering of increasingly the symbolic mode of representation. Mastering this incorporates becoming more skilled in translating between each mode, namely from enactive to iconic to symbolic.

### **2.3.3 Bruner on discovery learning**

Discovery learning is an instructional model based on cognitive views of learning and constructivist principles. Bruner (1966: 26) argues that “practice in discovering for oneself teaches one to acquire information in a way that makes that information more readily viable in problem solving”. This philosophy which later became the discovery learning movement of the 1960s suggests that learners “learn by doing”.

The ideas that discovery learning is a method of instruction through which learners interact with their environment by exploring and manipulating objects links very well to the ideas found in especially social constructivism. The learning-by-doing-idea requires from learners for instance to deal with questions, performing experiments, do research and work out a project to arrive at solutions. Discovery learning is therefore especially used in problem solving where the learner draws on his own experience and prior knowledge to work towards solutions. Discovery learning is a method of inquiry-based instruction with

the particular problem to be solved. Because this theory is inquiry-based and takes place in problem solving situations where the learner draws on his or her own past experience and existing knowledge, learners are encouraged to discover facts and relationships and to learn new truths on their own through action and experience. Learners interact with the world by exploring and manipulating objects, wrestling with questions and controversies, or performing experiments. As a result, learners may be more likely to remember concepts and knowledge discovered on their own (in contrast to a transmissionist model). The teacher's role is to ensure that learning activities arouse the learner's curiosity, minimize the risk of failure, and are relevant to the learner (Du Plessis, Conley and Du Plessis 2007: 5, 6).

Proponents of this theory believe that discovery learning has many advantages, including that it -

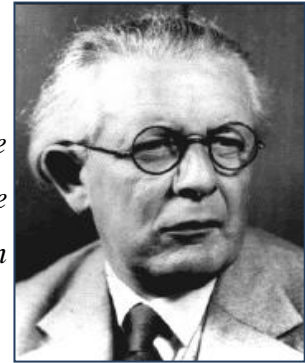
- encourages active engagement;
- promotes motivation;
- promotes autonomy, responsibility and independence;
- stimulates the development of creativity and problem solving skills; and
- a tailored learning experience (Bruner, 1986: 26 as cited in Du Toit, 2000: 76).

In all Bruner's work it is evident that the more often and earlier learners are engaged the better the possibility to create active learners who value knowledge and education. Bruner's most beneficial ideas warrant *discussion and application*. For that reason it is necessary to see beyond scaffolding and the spiral curriculum and recognize Bruner's urge to developing young minds with an avid interest in learning beyond the classroom and throughout life.



## 2.4 JEAN PIAGET (1896–1980)

*There are no more such things as societies qua beings than there are isolated individuals. There are only relations ....and the combinations formed by them, always incomplete, cannot be taken as permanent substances (Piaget, 1932: 360).*



*.. there is no longer any need to choose between the primacy of the social or that of the intellect: collective intellect is the social equilibrium resulting from the interplay of the operations that enter into all cooperation (Piaget, 1970: 114).*

Papert (*Time*, March 29, 1999: 105) argued that Piaget was the first to explore a kind of epistemological relativism in which multiple ways of knowing are acknowledged and examined non-judgementally, yet with a philosopher's analytic rigor. The core of Piaget's conviction is that looking carefully at how knowledge develops in children will elucidate the nature of knowledge in general – an idea which will remain controversial in educational theory (Cole et al., 2005; Chapman, 1988; Labinowicz, 1980).

It appears that Piaget held the reason for the invariability of sequence to derive from the idea that knowledge is not simply acquired from outside the individual, but it is *constructed from within*. Once knowledge is *constructed internally*, it is then tested against reality the same way a scientist tests the validity of hypotheses. Atherton (2005) explains that like a scientist, the individual learner may discard, modify, or reconstruct knowledge based on its utility in the real world. Much of this construction (and later reconstruction) is in fact done subconsciously.

Piaget is concerned with getting answers to thinking processes behind particular responses (Labinowicz, 1980: 20-28). In other words, he is interested not only in what learners know, but how they come to know and attain the ability to more accurately represent the world and perform logical operations on representations of concepts grounded in interactions with the world. His developmental theory concerns the emergence and construction of schemata or schemes of how one perceives the world (Brewer and Treyns, 1981: 207-230).

Although Piaget identified the schemata as "*developmental stages*", he argues that the sum of intellectual development is a combination of maturation, physical experience, social interaction and equilibration (Labinowicz, 1980: 46).

For Piaget each of the following developmental stages is an indication of times when children are acquiring new ways of mentally representing information (as explained in Inhelder and Piaget, 1958 and 1964; Piaget, 1953 and 1955):

- *Sensorimotor stage*: from birth to age 2 years (children experience the world through movement and senses and learn object permanence).
- *Pre-operational stage*: from ages 2 to 7 (acquisition of motor skills).
- *Concrete operational stage*: from ages 7 to 11 (children begin to think logically about concrete events).
- *Formal operational stage*: after age 11 (development of abstract reasoning).

Although Piaget's four stages of childhood development are worth mentioning, the research in this study rather focuses on his interest in *epistemology – the theory of knowledge*, which includes working with knowledge and how learning takes place.

A close analysis of Piaget's four stages reveals that they reflect four types of *thought structures*. This chronological sequence appears to be inevitable, because one structure may be necessary in order to *construct (or construct knowledge at)* the next level. According to both Piaget and Vygotsky, knowledge must be *discovered and constructed through the learner's activities*. They argue that learners learn from concrete experience because by nature learners are continually active and therefore must find out about and make sense of the world and as they do so, they construct the mental structures that permit them to deal with ever more complex information.

#### **2.4.1 Piaget's view of the learner's mind**

Piaget (1896-1980) born in the French-speaking part of Switzerland, had interests in biology, natural science, philosophy, psychoanalysis, general psychology and education. This biologist who originally studied molluscs (publishing twenty scientific papers on

them by the time he was 21) moved into the study of the development of children's understanding through observing them and talking and listening to them while they worked on exercises he set. Mwamwenda (2004: 95-97) stresses Piaget's focus on the importance of actions in the acquisition of knowledge. Piaget argued that activity and being actively involved in the learning process is the foundation for cognitive development. Teachers should therefore give learners the opportunity to manipulate objects experimentally and actively (Nieman and Monyai, 2006: 93).

#### **2.4.2 The developmental process**

One might say that Piaget was the first to take children's thinking seriously, because as early as 1928, Piaget viewed children as *little philosophers*, calling them *tiny thought-sacks* and scientists building their own individual theories of knowledge (as discussed in Piaget, 1928). Piaget used the difficulties children might experience and the so-called "problem areas" to come to an understanding of how a child's cognitive growth and development takes place (Papert, in *Time*, March 29, 1999: 105).

Piaget provided no concise (or clear) description of the development process of a child as a whole, but broadly speaking it consisted of a particular cycle:

- The child performs an *action* which has an effect on or organizes objects, and the child is then able to note the characteristics of the action and its effects.
- Through repeated *actions*, perhaps with variations or in different contexts or on different kinds of object, the child is able to differentiate and integrate its elements and effects. This is the process of *reflecting abstraction* (described in detail in Piaget, 2001).
- At the same time, the child is able to identify the properties of objects by the way different kinds of *action* may affect him or her. This is the process of *empirical abstraction*.
- By repeating this process across a wide range of objects and actions, the child establishes a new level of knowledge and insight. This is the process of forming a new *cognitive stage*. This dual process allows the child to construct new ways of dealing with objects and new knowledge about objects themselves.

- However, once the child has *constructed these new kinds of knowledge*, he or she starts to use them to create even more complex objects and to carry out even more complex actions. As a result, the child starts to recognize more and more complex patterns and to construct more and more complex objects. Thus a new stage begins, which will only be completed when all the child's activities and experiences have been re-organized on this higher level.

At the same time, by reflecting on their own actions, children develop an increasingly sophisticated awareness of the “rules” that govern in various ways. For example, it is by this route that Piaget explains this child's growing awareness of notions such as “*right*”, “*valid*”, “*necessary*” and “*proper*”. In other words, it is through the process of objectification, reflection and abstraction that the child constructs the principles on which *action is not only effective or correct but also justified*.

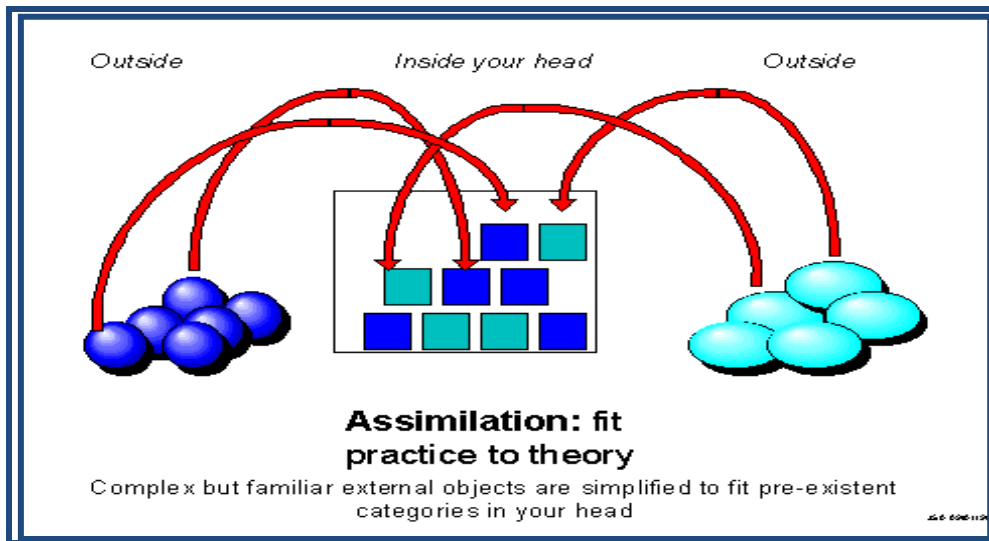
Piaget's views can therefore be considered to be “*constructivist*”, hence the idea that all learners construct cognitive abilities through self-motivated action in the world (Piaget, 1955).

### **2.4.3 Constructing knowledge and meaning through accommodation and assimilation**

In general terms the formalization of the theory of constructivism is also attributed to Piaget, because he articulated mechanisms by which knowledge is internalized by learners. He suggested that through processes of *accommodation* and *assimilation*, individuals construct new knowledge from their experiences.

When individuals assimilate, they incorporate the new experience into an existing framework without changing that framework. This may occur when individuals' experiences are aligned with their internal representations of the world, but may also occur as a failure to change a faulty understanding; for example, they may not notice events, may misunderstand input from others, or may decide that an event is a fluke and is therefore unimportant as information about the world. By contrast, when individuals' experiences

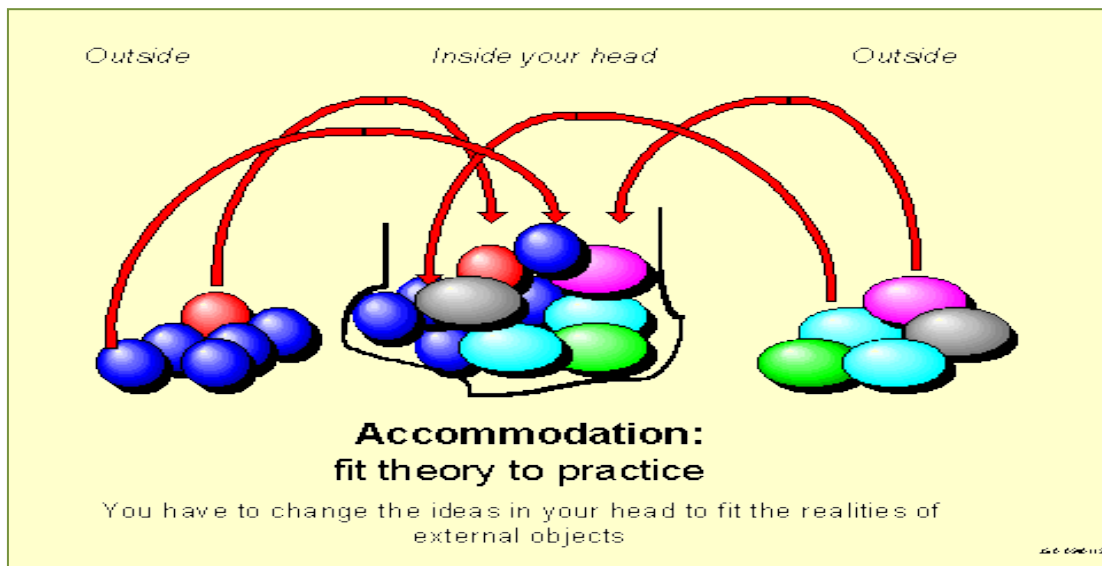
contradict their internal representations, they may change their perceptions of the experiences to fit their internal representations (Labinowicz , 1980: 36, 150).



**Figure 2.1: Assimilation of knowledge as adapted from Atherton, 2005**

In *accommodation*, the internal world has to *accommodate* itself to the evidence with which it is confronted and thus adapt to it, which can be a difficult and painful process. For instance in the database analogy, it is similar to what happens when a person tries to put in information which does not fit the pre-existent fields and categories. A person therefore has to develop new ones to accommodate the new information.

According to Piaget's theory, accommodation can even be understood as the mechanism by which failure leads to learning. He explains that when a person acts on the expectation that the world operates in one way and it violates expectations, the person may fail, but by accommodating this new experience and reframing his or her model of the way the world works, the person still learns from the experience of failure, or others' failure. Therefore accommodation can be understood as the process of reframing one's mental representation of the external world to fit new experiences (Labinowicz , 1980: 38-41, 150, 168).



**Figure 2.2: Accommodation of knowledge as adapted from Atherton, 2005**

From the discussion above it is clear that Piaget's approach is central to the school of cognitive theory known as "*cognitive constructivism*", where others, known as "*social constructivists*", such as *Vygotsky and Bruner*, have laid more emphasis on the part played by language and other people in enabling children to learn.

## 2.5 LEV VYGOTSKY (1896-1934)

Lev Semenovich Vygotsky, a Soviet developmental psychologist lived during the Russian Revolution (a time of great change in his culture) and worked from 1924-34 extensively on ideas about cognitive development, particularly



the relationship between language and thinking. Vygotsky's changing environment during the revolution greatly influenced his own view that cognitive processes, cognitive developmental and the construction of meaning do not occur in isolation. Presently the South African educational environment is also going through a culture of change especially regarding instructional design and assessment practices. Therefore Vygotsky's theory may provide some insight into how the current teaching-learning situation can be reviewed.

Vygotsky developed a socio-cultural approach to cognitive development. Although he developed his theories at approximately the same time as Piaget was starting to develop his

(the 1920s and 1930s), Vygotsky's untimely death at the age of 38 left his theories incomplete – although some of his writings are still being translated from Russian.

Vygotsky's theories stress the fundamental role of *social interaction* in the development of cognition (Wertsch, 1985; Vygotsky, 1978), as he believed strongly that social interaction plays a central role in the process of making meaning. Vygotsky focuses on the connections between people and the socio-cultural context in which they act and interact in shared experiences (Crawford, 1996: 43-46). Borich and Tombari (1997: 178) concur with the Vygotskian notion that learners make use of their experiences to “actively construct understanding in a way that makes sense to them”.

Unlike Piaget's notion that children's development must necessarily precede their learning, Vygotsky argued, “learning is a necessary and universal aspect of the process of developing culturally organized, specifically human psychological function” (Vygotsky, 1978: 90). In other words, Vygotsky argues that social learning tends to *precede* development.

Vygotsky's theory promotes learning contexts in which learners play an active role in learning. Roles of the teacher and learners are therefore shifted, as a teacher should collaborate with his or her learners in order to help facilitate the construction of meaning. Learning therefore becomes a reciprocal experience for the learners and teacher.

Vygotsky's interests in the fields of developmental psychology, child development, and education were extremely diverse (Wertsch and Sohmer, 1995: 332-337). Beside the focus on the social factors in cognition (Vygotsky, 1978), his writings also emphasized the roles of historical and cultural aspects (Vygotsky, 1929). He also argues that language (Vygotsky, 1962 and 1978) is the most important symbolic tool provided by society. His innovative work in psychology includes several key concepts such as *psychological tools*, *mediation*, and *internalization* as well as the *zone of proximal development* (Vygotsky, 1978). He also focused on the interrelation between language and thought and how learning can best take place when mediating concepts (Vygotsky, 1962).

In this sense, conversational theories which link with the Vygotskian views regarding mediation and the importance of language fit neatly into a constructivist framework. The emphasis here is on the learner as an active "*maker of meanings*". The role of the teacher is to enter into a *dialogue* with the learner, in an attempt to understand the meaning that the learners attached to the material to be learned, and to help them then to refine the understanding until it corresponds with the understanding the teacher, as the more knowledgeable one in this particular situation, holds (Atherton, 2005).

For the purpose of this research the focus will be on Vygotsky's contribution as it concerns the interrelationship of *language development and thought from social interaction in the educational situation*.

### **2.5.1 Social interaction as core of cognitive development**

Regarding social interaction and the link with cognitive development, Vygotsky (1978: 57) states:

*Every function in the child's cultural development appears twice: first, between people (interpsychological) and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of ideas. All the higher functions originate as actual relationships between individuals.*

According to Vygotsky, learning occurs through *social interaction*, especially where the teacher may model behaviours and/or provide verbal instructions – which Vygotsky refers to as co-operative or collaborative dialogue. The learner seeks to understand the actions or instructions provided by the teacher (who can be a parent or peer as well) then internalises the information, using it to guide or regulate their own performance.

In order to gain an understanding of Vygotsky's theories of cognitive development, it is necessary to have knowledge of two of the main principles of Vygotsky's work: the *zone of proximal development (ZPD)* and the idea of a *more knowledgeable other (MKO)* as discussed in detail in his 1962 work *Thought and Speech/Thought and language*.



### **2.5.2 Vygotsky's view on zone of proximal development (ZPD)**

The “more knowledgeable other” (MKO) mentioned to in *paragraph 2.5.1* refers to someone who has a better understanding or a higher ability level than the learner, with respect to a particular task, process, or concept. The MKO may be any individual with more knowledge or experience, whether he/she is a teacher, another adult, a peer, a sibling or even electronic performance support systems which can be programmed as such. The concept of the more knowledgeable other (MKO) is integrally related to Vygotsky's notion of the *zone of proximal development* (*Chapter 2, paragraph 2.5.2*).

Vygotsky sees the zone of proximal development as the area where the most sensitive instruction or guidance should be given – allowing children to develop skills they will then use on their own – developing higher mental functions. Vygotsky also views interaction with peers as an effective way of developing skills and strategies. He suggests that educators use co-operative learning exercises where less competent learners can develop their understanding with the support from more skilful peers – within the zone of proximal development (Du Plessis, Conley and Du Plessis, 2007: 9).

The concept of scaffolding is closely related to the ZPD, although Vygotsky himself never used the term; instead, it was developed by other socio-cultural theorists like Ann Brown, Wood, Bruner and Ross. *Scaffolding* refers to the context provided by knowledgeable people such as adults to help children to develop their cognitive skills. *Scaffolding* is a process through which a teacher or more competent peer gives aid to the learner in her/his ZPD as necessary. Then there is gradual withdrawal of support as the child's knowledge and confidence increase much as a scaffold is removed from a building during construction. According to Balaban (1995: 52) “Scaffolding refers to the way the adult guides the child's learning via focused questions and positive interactions.”

Scaffolding will be discussed in more detail in *Chapter 3* where the focus is on the choice of teaching strategy to enable learners towards creative own understanding.

### 2.5.3 Language: The core of learning

As mentioned in *paragraph 2.5*, one of Vygotsky's most important contributions concerns the interrelationship of language development and thinking processes. According to Vygotsky language plays two critical roles in cognitive development, namely that it is the main means by which adults transmit information to children and that language itself becomes a powerful tool of intellectual adaptation.

However, whilst Piaget sees speech/language as an expression of the child's thinking/understanding (understanding comes first – language comes later to express the understanding), Vygotsky sees "private speech" as a means for children to plan activities and strategies and therefore aid their development. Language is therefore an accelerator to thinking/understanding (Bruner also views language in this way, see *Chapter 2, paragraph 2.3*).

This concept, explored in Vygotsky's 1962 book *Thought and Language*, (alternative translation: *Thinking and Speaking*) establishes the profound connection between speech (both silent inner speech and oral language), and the development of mental concepts and cognitive awareness. It should be noted that Vygotsky describes inner speech as being qualitatively different from normal (external) speech.

Language starts as a tool used for social interaction external to the learner. The learner guides personal behaviour by using this tool in a kind of self-talk or "thinking out loud." Gradually self-talk is used more as a tool for self-directed and self-regulating behaviour. Then, because speaking has been appropriated and internalized, self-talk is no longer present around the time the child starts school. Self-talk "develops along a rising not a declining, curve; it goes through an evolution, not an involution" and according to Vygotsky, in the end, it becomes inner speech (Vygotsky, 1987: 57). Inner speech develops through its differentiation from social speech.

Vygotsky (1962, 1987) argues that inner speech is not comparable in form to external speech, because while external speech is the process of turning thought into words, inner speech (as the opposite) is the conversion of speech into inward thought. Inner speech for

example contains predicates only and words are therefore used much more economically – therefore one word in inner speech may be so replete with sense to the individual that it would take many words to express it in external speech.

Vygotsky (1962, 1987) is thus of opinion that speaking has developed along two lines, the line of *social communication* and the line of inner speech. This is not to say that thinking cannot take place without language, but rather that it is *mediated by* it and thus develops to a much higher level of sophistication. This also implies that cognitive development is dependent on *social interaction* and *social learning* as already discussed above in *paragraph 2.5.2.* under the phenomenon called the zone of proximal development.

According to Vygotsky, humans use tools that develop from a culture, such as speech and writing, to mediate their social environments. Therefore he focuses on the connections between people and the cultural context in which they act and interact in shared experience (Crawford, 1996: 43-50). Initially learners develop these tools to serve solely as social functions, ways to communicate needs. Vygotsky believes that the internalization of these tools *leads to higher thinking skills*; he also believes that *thought and language* could not exist without each other (Vygotsky, 1962, 1978).

Vygotsky's strong assumptions about the active individual are reflected in his focus on practices such as speaking and thinking. The researcher found from different sources (Valsiner 1993; Wozniak, 1993) that although the learner is involved in making sense as active individual, the role of the active environment as well as the culture and background of the learner cannot be denied to play a role in the process of finding new meaning.

#### **2.5.4 Vygotskian views of social cognition and learning**

Vygotsky's observations of how higher mental functions developed historically within particular cultural groups, as well as individually through social interactions with significant people, strengthen his view that culture is the prime determinant of individual development (as described in Vygotsky, 1978).

Through social interactions, new habits, including speech patterns, written language and other symbolic knowledge through which meaning can be derived, are learned. This can affect the construction of knowledge and impact on intellectual development. Vygotsky is of opinion that much of the content of thinking can be acquired through culture, but also that culture provides a child with the processes or means of thinking. In other words, according to Vygotsky, culture can provide all the tools of intellectual adaptation for both *what to think and how to think*. Vygotsky argues that learners can internalise new knowledge and tools of thought primarily through *language* in a social setting.

*Internalization* can be understood in one respect as “*knowing how*”. Gilbert Ryle indicated as early as 1949 that *learning how* or improving an ability is not only acquiring information, because working with truths which can be imparted, the learning can be relatively sudden. On the other hand, whereas dealing with procedures which need to be inculcated, the process of learning (inculcation) may be a gradual process. It makes sense to ask at what moment someone became apprised of a truth, but not to ask at what moment someone acquired a skill (Ryle, 1949: 58). Although there is a difference between “*knowing that*” and “*knowing how*”, there is a growing emphasis on “*knowing how*”. The internalization of knowledge (*know how*) can be a result of the mastery of skills which occur through the activity of the learner within a society, through social interaction. The process to internalise can also lead to a learner’s creation of a new or unique way to apply the particular knowledge or skills.

In this regard John Dewey (1938/1963: 39) explains that people are what they are because much is transmitted from and through previous human activities. He also argues that no experience happens in a vacuum, but that outside sources can give rise to experience.

The work of Vygotsky portrays the view of the Russian cultural-historical psychologists which coupled a focus on the cultural medium with the assumption that the special mental quality of human beings is their need and ability to mediate their actions through artefacts. The notion of *mediation* became to Vygotsky *the central fact about psychology* (Vygotsky, 1982: 166).

*Language* was the form of mediation that preoccupied Vygotsky above all others, but when speaking of *signs*, or *psychological tools*, he had a more extensive set of mediational means in mind, a set that included “various systems for counting; mnemonic techniques; algebraic symbol systems; works of art; writing; schemes, diagrams, maps, and mechanical drawings; all sorts of conventional signs, and so on” (Vygotsky, 1981: 137). Higher mental functions are, by definition, culturally mediated; they involve not a “direct” action on the world, but an indirect action, one that takes previous knowledge and incorporates it as an aspect of action. How the mental work was adapted and changed to suit the present, may include alteration, replacing of functions, a re-creation or even an abolishment of what is not necessary (Vygotsky, 1981: 139-140). This means that mental processes can be shaped and transformed by language and social interaction.

Vygotsky’s view of social cognition also implies that all psychological functions begin, and to a large extent remain, culturally, historically, and institutionally situated and context specific. In a sense, then, there is no way not to be socio-culturally situated when carrying out an action. Conversely there is no tool that is adequate to all tasks, and there is no universally appropriate form of cultural mediation. Even language, the “tool of tools” is no exception to this rule. Making cultural mediation central to mind and mental development, means that the meaning of an action and of a context are not specifiably independent of each other. Taking “*action in context*” requires a relational interpretation of mind. Furthermore it means that the “whole self” is involved in this cultural setting where mediation is taking place (Vygotsky, 1981: 139).

For Vygotsky the social world does have primacy over the individual in a very special sense. Society is the bearer of the cultural heritage without which the development of mind is impossible, but it is also noteworthy that both social processes and individual processes are part of mediation through artifacts (tools) like language and cultural settings.

### **2.5.5 Piaget and Vygotsky’s views compared**

- Like Piaget, Vygotsky believes that young children are curious and actively involved in their own learning and the discovery and development of new understandings/schema. However, Vygotsky places more emphasis on social

contributions to the process of development, whereas Piaget emphasises self-initiated discovery. Vygotsky approaches development differently from Piaget. Piaget believed that cognitive development consists of four main periods of cognitive growth: sensorimotor, preoperational, concrete operations, and formal operations. Piaget's theory suggests that development has an endpoint. Vygotsky, in contrast, believes that development is a process that should be analyzed, instead of a product to be obtained. According to Vygotsky, the development process that begins at birth and continues until death is too complex to be defined by stages (Driscoll, 1994; Hausfather, 1996).

- Vygotsky places *more emphasis on culture* affecting/shaping cognitive development – this contradicts Piaget's view of universal stages and content of development. Piaget's theory emphasizes the natural line (developmental stages), while Vygotsky favours the cultural line of development with emphasis on development through social interaction.
- Vygotsky places considerably *more emphasis on social factors* contributing to cognitive development. Piaget found that children act independently on the physical world to discover what it has to offer. Vygotsky, on the other hand, wrote in *Thought and Speech/Thought and language (1962)* that human mental activity is the result of social learning. As children master tasks they will engage in co-operative dialogues with others, which led Vygotsky to believe that acquisition of language is the most influential moment in a child's life.

Opposing Vygotsky's zone of proximal development, Piaget believes that the most important source of cognition is the children themselves. But Vygotsky argues that the social environment could help the child's cognitive development. The social environment is an important factor which helps the child culturally adapt to new situations when needed. Piaget is criticised for underestimating the importance of the social environment.

- Vygotsky places more (and different) *emphasis on the role of language* in cognitive development (again Piaget is criticised for lack of emphasis on this).
- Vygotsky refers to *tools of intellectual adaptation* – these allow children to use the basic mental functions more effectively/adaptively, and these are culturally determined (e.g. memory mnemonics, mind maps). Vygotsky therefore sees

cognitive functions, even those carried out alone, as affected by the beliefs, values and tools of intellectual adaptation of the culture in which a person develops and therefore socio-culturally determined. The tools of intellectual adaptation therefore vary from culture to culture – as in the memory example.

In conclusion, both Vygotsky and Piaget had the common goal of finding out how learners (children) master ideas and then translate them into speech. This emphasises again the significance of language in teaching and learning as the channel through which knowledge is gained.

## **2.6 REUVEN FEUERSTEIN (1921- )**

During the 1950's, Reuven Feuerstein studied cognitive psychology in Geneva under Piaget, Inhelder, and others and was a peer of Lev Vygotsky's. He extended the work of Piaget on structural cognitive modifiability. The essence of Feuerstein's theory is that "Intelligence is not fixed. It is modifiable" (Feuerstein, 1990). The concepts that intelligence can be developed within a mediated learning environment as created with the theory of *Mediated Learning Experience* and the notion that intelligence can be "taught", are central to the theory of *Structural Cognitive Modifiability*.

Especially the ideas relating to how modification takes place by means of mediation between educator and learner will be used in the research to establish how, for instance, the use of questions can impact on effective teaching, learning and assessment. The mediator of learning usually works with the learner in such a way that both educator and learner will discover how the learner learns and how to improve (modify) the learner's learning process (Niemann and Monyai, 2006: 9).

Feuerstein presents the view that cognition is a variable; therefore thinking patterns can change and intelligence is modifiable. He states that the reference to "structural changes, or to changes in the state of the organism, brought about by a deliberate program of intervention". Such intervention will facilitate the generation of continuous growth by rendering the organism receptive and sensitive to internal and external sources of stimulation (Feuerstein, 1980). In other words, human beings can learn to learn how to

learn. The human being is capable of modifying the underlying structure of his cognition. Feuerstein calls this process through which we help humans develop the capacity to adapt to their environments “the mediated learning experience”. Feuerstein (1980: xvii) claims that the “*concept of mediated learning experience, is an intergenerational relationship determined by the strong need for ensuring continuity beyond the biological existence of the individual. Cultural and spiritual continuity are materialized in a variety of ways and situations*”. Nieman and Monyai (2006: 9) explain that the teacher broadens the learner’s environment and connects it with previous experiences and cultural background in this mediation process. In this way learners are able to link divergent aspects of experience together in a meaningful way.

Ben-Hur (2000, as cited in Rotterdam, 2000: 5-6) claims that Feuerstein’s theory of mediated learning requires that teachers interpose themselves between the learner and his or her experiences. According to the theory the diversity in learner performance reflects the different needs for mediated learning to a large extent. For many learners, meaningful learning and the development of new concepts cannot happen without mediation. Mediated learning differs from direct or experiential learning in that in the mediated learning experience there is the intervention of a human to filter the environment to the organism. Instead of the direct Stimulus – Response (S – R) of Skinner (*as discussed under behaviourism in paragraph 2.2.1*) or the Stimulus – Organism - Response (SOR) of Piaget (*discussed in paragraph 2.3*), Feuerstein instead proposes a Stimulus – Human – Organism – Human – Response model (SHOHR). The mediator's intention according to the Feuerstein model is NOT to help the learner to solve the problem posed by the stimulus. It is rather to understand, with the learner, the *process* whereby the learner learns. The stimulus, in the form of a test, has been designed to make it possible for the two of them to investigate this process. The learner is involved in a three-step learning process. In the first step the learner receives the stimulus which has been especially designed to make it possible for the learner and mediator to gain insights into the learning process. In the second stage the learner processes the information. In the third stage the learner decides upon a response, and is also assisted by the mediator. Feuerstein describes this three step process as a “*Mediated Learning Experience*”.



Rotterdam (2000: 6) argues that a quality mediated learning experience has three essential ingredients, namely *intentionality and reciprocity, mediation of meaning, and mediation of transcendence* which are necessary for any mediation to occur. The *mediator* explicitly conveys to the learner his *intention to mediate* and the *learner* must *reciprocate by being metacognitively (consciously) aware* that he is learning. Intentionality and reciprocation is a vital two way street and results therefore in true communication.

Feuerstein (1990) argues that mediation of meaning occurs when the mediator communicates the importance and *reason* for an activity – only then a learner would receive a holistic view on why he/she has to learn particular content. Other qualities of mediation that might be present include: mediation of the feeling of competence, mediation of regulation and control of behaviour, mediation of sharing behaviour, mediation of the feeling of belonging, mediation of challenge, mediation of goal seeking, goal setting and goal planning behaviour, and mediation of an optimistic alternative.

In the Feuerstein approach the teacher's main role is thus that of a *mediator*, whose task is to help the learner learn. The task is *not* aimed at placing a specified body of knowledge into the learner's head. The mediator has to work with the learner in such a way that both of them discover how the learner learns and how to improve the learner's learning process. According to Feuerstein (1990, 1995) a lack of such mediated learning experience results in deficient cognitive functions in the individual.

## **2.7 A SOCIAL CONSTRUCTIVIST VIEW OF THE LEARNER**

### **2.7.1 The learner as a unique individual**

Social constructivism views each learner as a unique individual with unique needs and backgrounds. The learner is also seen as complex and multi-dimensional. Social constructivism not only acknowledges the uniqueness and complexity of the learner, but actually encourages, utilises and rewards it as an integral part of the learning process (Wertsch, 1985, 1991).

Furthermore, it is argued that the responsibility of learning should reside increasingly with the learner. Social constructivism thus emphasizes the importance of the learner being actively involved in the learning process, unlike previous educational viewpoints where the responsibility rested with the teacher to teach and where the learner played a passive, receptive role. It is clear that learners construct their own understanding and that they do not simply mirror and reflect what they read. Learners look for meaning and will try to find regularity and order in the events of the world even in the absence of full or complete information. Learners with different skills and backgrounds should collaborate in tasks and discussions in order to arrive at a shared understanding of the truth in a specific field.

Presseisen (1990: 148) summarises the constructivist idea about the learner's uniqueness as that each must become the "owner" of his or her own ideas and the independent master of own achievement.

### **2.7.2 The importance of the background and culture of the learner**

Social constructivism encourages the learner to arrive at his or her own version of understanding, influenced by his or her background, culture or embedded worldview. Historical developments and symbol systems, such as language, logic, and mathematical systems, are inherited by the learner as a member of a particular culture and these are learned throughout the learner's life. The learner's cultural background can provide the necessary context for effective mediation (Nieman and Monyai, 2006: 24). This also stresses the importance of the nature of the learner's social interaction with knowledgeable members of the society. Without the social interaction with other so-called "more knowledgeable" people, it is impossible to acquire the social meaning of important symbol systems and learn how to utilize them. Young children develop their thinking abilities by interacting with other children, adults and the physical world. From the social constructivist viewpoint, it is thus important to take into account the background and culture of the learner throughout the learning process, as this background also helps to shape the knowledge and truth that the learner creates, discovers and attains in the learning process (Wertsch, 1997).

### **2.7.3 The motivation for learning**

Another crucial assumption regarding the nature of the learner, concerns the level and source of motivation for learning. From different sources it is evident that sustaining motivation to learn is also strongly dependent on the learner's confidence in his or her potential for learning. These feelings of competence and belief in potential to solve new problems are derived from first-hand experience of mastery of problems in the past and are much more powerful than any external acknowledgement and motivation (Prawat and Floden, 1994: 37-48). This links with Vygotsky's "zone of proximal development" (Vygotsky, 1978) as discussed in *paragraph 2.5.2*. By experiencing the successful completion of challenging tasks, learners gain confidence and motivation to embark on more complex challenges. Rotterdam (2000: 6) also indicates that successful motivation of a learner creates reciprocity which enhances the communication process and assists learning.

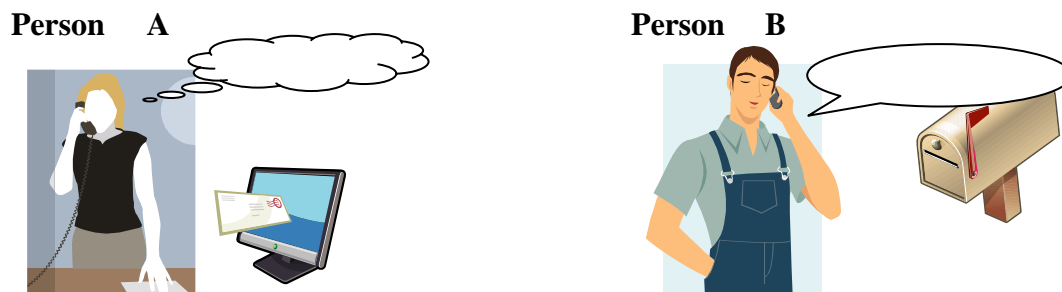
### **2.7.4 Learning as an active, social process**

Social constructivists like Piaget and Vygotsky view learning as an active process in which learners should learn to discover principles, concepts and facts for themselves. In fact, for the social constructivist, reality is not something that we can discover because it does not pre-exist prior to our social invention of it. Kukla (2000) argues that reality is constructed by our own activities and that people, together with other members of a society, invent the properties of the world.

Other constructivist scholars agree with this and emphasize that individuals make meanings through the interactions with each other and with the environment they live in. Knowledge is thus a product of humans and is socially and culturally constructed (Kukla, 2000; Prawat and Floden, 1994). They all agree that learning is a social process and state that learning is not a process that only takes place inside our minds, or a passive development of our behaviours that is shaped by external forces, but that meaningful learning occurs when individuals are engaged in social activities.

Vygotsky (1978) also highlighted the convergence of the social and practical elements in learning by saying that the most significant moment in the course of intellectual development occurs when speech and practical activity, two previously completely independent lines of development, converge. Through practical activity a learner constructs meaning at an intrapersonal level, while speech connects this meaning with the interpersonal world shared by the child and his or her culture.

A closer analysis of the process of communication reveals that thinking is done in terms of conceptual structures with a rich baggage of personal meanings and feelings attached to that. However when Person A is talking to Person B, Person A will necessarily try to express particular concepts (symbols) in words. So what Person B receives, are not Person A's meanings and feelings, but Person A's *symbols* representing those meanings. Person B has to interpret the symbols in terms of his (or her) own concepts and meanings attached to the symbols. Because Person B has a different background and different life experiences from those of Person A, Person B's meanings given to symbols will invariably be *different* from Person A's meanings attached to the same symbols. This situation is depicted in the following illustration:



It should be clear that communication and in particular the transfer of knowledge is problematic. *One-way communication* and the transfer of knowledge (*telling*) can only be successful if Person A and Person B have integrated almost the same meanings for the symbols, i.e. if their *concepts* are nearly the same.

If, however, they have vastly different concepts of the symbols, one of the following most probably will happen:

- Either there is a total breakdown of understanding, or

- Person B will *change* his *concepts* so that they are nearly the same as Person A's, and Person B will therefore understand what Person A is saying (Piaget's *accommodation*), or
- Person B will distort Person A's meanings to fit his own concepts behind the symbols (words), without changing his own concepts much (Piaget's *assimilation*), with the result that Person B will misunderstand Person A.

From the example above, it seems obvious that the way a learner assimilates and accommodates new concepts, will be influenced by the particular social setting, the references, language and abilities to create an own personalised understanding which will ensure knowledge transfer and application as well.

## 2.8 CONCLUSION

In *Chapter 2* an overview on learning theories according to the behaviourist and cognitivist views, served as background for a discussion of constructivist approaches to learning. The discussion of all three theories provided evidence why constructivism is the approach of choice in this study. The ideas of Bruner, Piaget, Vygotsky and Feuerstein, which could be linked to a constructivist approach to learning and the cognitive development of learners were emphasised. The ideas of the theorists referred to which could be aligned to a constructivist approach, included thoughts about learning as a process of change which may bring about new understanding and deeper thinking.

The mention of the role of modification of knowledge, the active involvement, the role of the social setting and the impact of language emphasised the ways in which the creation of personalised understanding of content and concepts can be established – a crucial part of constructivist thinking about learning.

*Chapter 3* will review the impact of learning approaches on instructional design and assessment practices. Particular teaching strategies will be referred to.

### 3. CHAPTER 3: VIEWS ON INSTRUCTIONAL DESIGN AND ASSESSMENT PRACTICE

#### 3.1 INTRODUCTION

This chapter serves as an introduction to instructional design methods according to the behaviourist, cognitivist and constructivist approaches, in order to provide a framework of dimensions to compare the differences in thinking about instructional design methods. In particular, the dynamics in constructivist teaching strategies and the role of scaffolding as “bridge” to new understanding will be referred to.

Moreover, the use of a taxonomy to plan effective assessment practices will be emphasised. The cognitive domain in Bloom’s taxonomy and the revised versions, Gagné’s taxonomy for learning strategies and the way the affective and psychomotor domains impact on the teaching-learning process form part of the investigation. The chapter closes with a discussion of what classroom assessment entails and what is understood by constructive assessment with the core purpose of learning in mind.

#### 3.2 INSTRUCTIONAL DESIGN



*If you don't know where you are going, any road will take you there. Lewis Carroll in Alice's Adventures in Wonderland (1865).*

The above quote from *Alice's Adventures in Wonderland (1865)* depicts the importance of planning and especially instructional design as a pathway to achieve a set outcome and to lead to an effective teaching-learning situation. As defined in *Chapter1, paragraph 1.5.7, instructional design* can be described as the process by which teaching-instruction is improved through the analysis of learning needs and systematic development of learning materials (van Merriënboer, 1997: 2-3). This practice to arrange content in such a manner that knowledge transfer can take place most effectively should also identify the current

level of learner understanding, defining the final outcome (end goal) of the teaching process (instruction), and creating some assistance in the process of understanding.

The instructional theory is traditionally rooted in cognitive and behavioural psychology as portrayed in the discussion of the learning theories in *Chapter 2, paragraphs 2.2.1 and 2.2.2*. Cognitivism has been criticised by Dreyfus (1991: 31-35) and others for allegedly ignoring the *context* in which learning and for that matter the process of teaching as well, takes place (as discussed in *Chapter 2, paragraph 2.2.2*). It is therefore clear that instructional design should not only focus on outcomes (objectives), but also account for a multi-cultured, multi-lingual, multi-faceted context. The researcher wants to think of instructional design also as a process to ensure the quality of teaching because it is based on the theory of learning, i.e. how learning is actually taking place.

### **3.2.1 Behaviourism and instructional design**

The behavioural objectives movement; the teaching machine phase; the programmed instruction movement; some individualised approaches, computer-assisted learning and the systems approach to instruction are, according to Paul Saettler (1990), the most important areas where the ideas from behaviourism had an impact on educational technology and especially the thinking about instructional design in general. Saettler (1990: 288) mentions that a behavioural approach holds learning objectives to be "specified, quantifiable, terminal behaviours", which has been a step forward in the thinking of instructional design.

In this discussion of a behaviourist view of instructional design the researcher will focus on the significance of especially the development of *behavioural objectives in a learning task*. From the description in *Chapter 2, paragraph 2.2.1.2* it appears that the behaviourists value measurable setting of objectives. The idea to structure a learning task in specific measurable activities, may give an idea how successfully the objectives were achieved and assessment will then be much easier because tests are set to measure each objective in a particular way.

A behaviourist approach to instructional design requires an *analysis of what should be taught and learned to specify objectives and to be able to adapt the programme* through the

results from formative evaluation. All these would all assist the learner to concentrate on a clear goal and to be able to respond automatically to the cues of a learning objective. Mayer (1999: 143) explains a behaviourist learning process as a strengthening or weakening by a learner of an association between a stimulus and response. This means that when the learner finds himself or herself in a situation where the stimulus for the correct response does not occur, the learner will not be able to respond, for instance when a learner does not understand a system or the reason for a question. It seems then that drill and practice will constitute much of the instructional design according to a behaviourist approach. Mayer (1999: 143) is of opinion that the instructional designer's role will be mainly to create environments where the learner is repeatedly cued to give a simple response, which is immediately followed by feedback. The researcher would like to add to this idea that the response by the learner can be guided by the particular set objective(s) or an indication by the teacher of what an acceptable response will be.

### **3.2.2 Cognitivism and instructional design**

As discussed in *Chapter 2, paragraph 2.2.2*, cognitive science began a shift from behaviouristic practices which emphasised external behaviour, to a concern with the internal mental processes of the mind and how these processes could be utilized in promoting effective learning. The design models that had been developed in the behaviourist tradition were not simply thrown out, but instead the "task analysis" and "learner analysis" parts of the models were embellished. The new models addressed component processes of learning such as knowledge coding and representation, information storage and retrieval as well as the incorporation and integration of new knowledge with previous information (Saettler, 1990: 280-294).

Because cognitivism and behaviourism are both governed by an *objective view of the nature of knowledge* and what it means to know something, the transition from behavioural instructional design principles to those of a cognitive style was not entirely difficult. The goal of instruction remained the communication or transfer of knowledge to learners in the most efficient, effective manner possible (Bednar, Cunningham, Duffy and Perry 1995: 100-111). For example, breaking down a task into small steps, works for a behaviourist who is trying to find the most efficient method of shaping a learner's behaviour. Doing



instructional design according to a cognitivist approach would include an analysis of a task; to break down the task into smaller steps or chunks; and then *to use that information to develop instruction that moves from simple to complex, building on prior schema*. This means that a cognitivist approach in instructional design is based on the careful organization of instructional materials from simple to complex. This has a lot to do with developing a systematic way of dealing with tasks.

One of the strengths of a cognitivist approach to instructional design is that *consistencies or exact cognitive structures* can be included to ensure that a learner will approach a task in a systematic manner. However, such a systematic approach may ignore the fact that every learner is an individual and therefore a general structure will not suit all learners.

Although Gagné's Nine Steps of Instruction as described in *The Conditions of Learning and Theory of Instruction* (1985: 246-256) link to some degree with behaviourist thoughts, there are also cognitivist links and some constructivist views in Gagné's steps of instruction.

For more clarity regarding the link between the steps of instruction and the constructivist ideas, a brief discussion of the steps seems to be necessary:

- The first of Gagné's nine steps of instruction is to *gain attention* which means that a problem or a new situation should be presented or include the use of something to grab the learner's attention, such as a story, demonstration or doing something the wrong way.
- A second step is to make *the learner aware of the objective of learning*. This allows learners to organize their thoughts around what they are about to see, hear and/or do. This relates to the notion in teaching and training that making the learner aware of the objective is *to tell them what you are going to tell them, to tell them*, and then *tell them what you have told them*. In other words it will be to describe the goal of a lesson, to state what the learners will be able to accomplish and how they will be able to use the knowledge.
- A third step is to *stimulate recall of prior knowledge*. This allows the learners to build upon their previous knowledge or skills. Although most people are capable of having

"creative" minutes, it is much easier to build upon what we already know. e.g. remind the learners of prior knowledge relevant to the current lesson, provide the learners with a framework that helps learning and remembering.

- A fourth step is to *present the material* by blending the information to aid in information recall. The idea here is also to “chunk” the learning material into levels of difficulty and cognitive demand – an aspect which has direct links to the use of Bloom’s taxonomy. It appears that this will also allow a teacher to give structured feedback to the learner.

- A fifth step is to *provide guidance for learning*. The guidance includes instructions on how to learn and not the representation of the material.

- Gagné (1985: 254) indicates a sixth step to be to *elicit performance*. The teacher lets the learner do something with the newly acquired behaviour, skills, or knowledge.

- A seventh step is to *provide feedback*. Gagné (1985: 254) explains that the teacher should communicate to the learner the correctness and the degree of correctness of the performance. This appears to be specific feedback which will include reasons "why" learners performed as they did. This idea is also found in the constructivist approach regarding formative assessment, which includes specific guidance.

- *Assessing performance* serves as Gagné’s eighth step. The teacher has to test (assess) to determine whether learning has occurred.

- The ninth step is to *enhance retention and transfer*. Gagné (1985: 255) is of the opinion that increased practice constitutes a fairly dependable factor affecting the amount of retention. It seems that the amount of practice and the structure thereof can influence the transfer of knowledge, skills and strategies to new problems and new situations.

### **3.2.3 Constructivism and instructional design**

While behaviourism and constructivism are very different theoretical perspectives, cognitivism shares some similarities with constructivism. Perkins (1991: 21) explains that

constructivism sees the mind not just as an information processor (cognitivism) to reorganise data. Rather, that the mind can wield data flexibly during learning by for instance testing tentative interpretations. This underlines that each individual is responsible for knowledge construction which makes it more difficult in instructional design to cater for the individual learner. Besides taking the individual learner into account, a constructivist approach to instructional design emphasizes the role of conducive teaching-learning environments to foster effective learning. Perkins (1991: 22, 23) argues that in order for such teaching-learning environments to be conducive, opportunities should be used to -

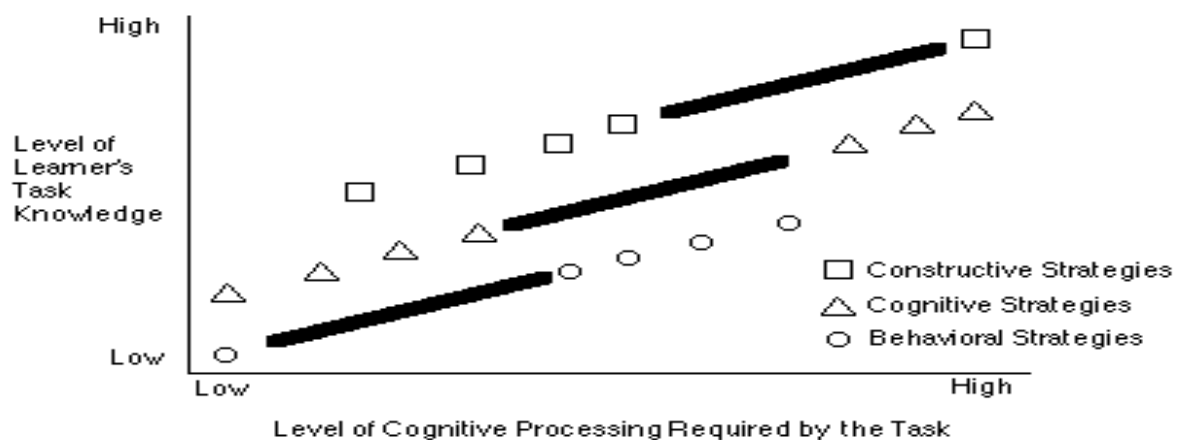
- provide multiple representations of reality and not only an oversimplification of the world;
- present authentic, contextualized tasks;
- provide real-world, case-based learning environments, rather than pre-determined instructional sequences;
- foster reflective practice;
- enable context- and content-dependent knowledge construction; and
- support collaborative construction of knowledge through social negotiation and mediation.

The learner being taught in such a conducive teaching-learning environment should be more able to interpret multiple realities and should be better able to deal with problem solving in real life situations. This implies that learners will also be better able to apply their existing knowledge to a novel situation.

Regarding the quality of learning in particular teaching-learning situations, Jonassen (1991: 5-14) point out that the difference between a constructivist view of instructional design and what he calls an objectivist view (behavioural and cognitive) of instructional design is that the objective design has a predetermined outcome and intervenes in the learning process to map a pre-determined concept of reality into the learner's mind, while a constructivist view maintains that because learning outcomes are not always predictable, *instruction should foster learning and not control learning.*

Some literature on constructivist design suggests that learners should not simply be let loose in a so-called “hypermedia or hypertext environment”, but that a mix of cognitive and constructive instruction/learning design to be implemented. For instance, Reigeluth and Moore (1999: 54) advise inclusion of metacognitive strategies in a constructivist instructional design, although these strategies were first explored by cognitivists. Such metacognitive strategies may include the use of learners’ prior knowledge and for them to receive some instruction to develop their own understanding. This requires the instructional designer to understand the strengths and weaknesses of each learning theory to optimize the use of such theory or approach appropriately in an instructional design strategy. The best design decisions are most certainly based on in-depth knowledge of learning theories.

Illustrated below, is the suggestion from Ertmer and Newby (1993: 50-70) that different learning theories can be used to complement the learner's level of task knowledge and to meet a variety of learning situations.



Comparison of the associated instructional strategies of the behavioral, cognitive, and constructivist viewpoints based on the learner's level of task knowledge and the level of cognitive processing required by the task.

From Ertmer and Newby: *Behaviorism, Cognitivism, Constructivism: Comparing Critical Features from an Instructional Design Perspective*

### Figure 3.1: Behavioural, cognitive and constructivist instructional strategies

Source: Ertmer, P. A., Newby, T. J. 1993. Behaviourism, Cognitivism, Constructivism: Comparing critical features from an instructional design perspective. *Performance Improvement Quarterly*, 6 (4), 50-70.

Figure 3.1 confirms that the application of instructional strategies may vary according to the level of knowledge the learner has about the task as well as the particular demand in

cognitive processing required by the task. Behavioural strategies are applicable where the task required low cognitive demands, whereas constructive strategies are of utmost importance in organising and structuring new knowledge, concepts and content. It is also evident from the figure that constructive strategies assist the learner towards deeper thinking and developing his or her understanding of particular concepts.

Both behaviourism and cognitivism are objective in nature and support the practice of analyzing a task and breaking it down into achievable units, establishing objectives, and measuring learner performance based on those objectives. Mayer (1999: 143-144) identifies the use of cognitivist strategies as part of a process of knowledge acquisition with information as a commodity that can be transmitted directly from teacher to learner.

Constructivism, on the other hand, promotes a more open-ended learning experience and knowledge construction. Using constructivist strategies allows the learner to be actively involved in constructing a knowledge representation. In this process the learner becomes a sense-maker and the teacher a cognitive guide who provides guidance.

Because of designing challenges associated with constructive learning, it might be easier and less time consuming for a teacher to work from the objective approach to plan teaching, but then the learner and the specific teaching-learning environment is not taken into consideration. Schwier (1995: 119-127) argues compellingly that the learning content, level of the learner and situation will determine what works, where and how in order to obtain some focus in the approach to instructional design. It is necessary to consider the context before deciding on a specific methodology.

Having noted the eclectic nature of instructional design, it should be noted that not all theorists advocate an overlapping use of approach and strategy for instructional design. Bednar et al. (1995: 100-111) argue for the use of a single approach in planning and instructional design. They explain that an attempt to abstract (decontextualise) concepts and strategies from the theoretical position, strips them of their original application and meaning and therefore they prefer a constructivist approach to instructional design with no incorporation of any other strategy from any other approach.

### **3.3 THE NATURE OF CONSTRUCTIVIST TEACHING STRATEGIES**

Constructivist teaching techniques are based on the constructivist learning theory as discussed in *Chapter 2, paragraph 2.2.3*. Constructivists suggest learning is more effective when a learner is actively engaged in the construction of knowledge rather than passively receiving it. Du Plessis et al. (2007: 15) restate the principles of constructivism by referring especially to the point of departure that learning is an active process of construction and reconstruction of meaning which takes place in a particular context. If learning is then seen as a change of meaning, and therefore the focus is on *how* learners learn, the way instruction is designed and the choice of teaching strategies become crucial. In agreeing with Jonassen's (1999: 217) assumption that knowledge cannot be transmitted, but that the instruction should consist of *experiences that facilitate knowledge construction*, the researcher keeps the idea of "*how learners learn*" in mind. As discussed in *Chapter 2, paragraph 2.5.4*, the researcher accepts that knowledge is individually and socially co-constructed based on the learners' interpretation and experience of the world and teaching-learning environment.

In order to further investigate teaching strategies related to a constructivist approach, it is necessary to first discuss some characteristics of constructivist teaching in general.

#### **3.3.1 Characteristics of constructivist teaching**

One of the primary goals in using constructivist teaching is that learners learn *how to* learn by giving them the opportunity to take initiative and responsibility for their own learning experiences.

In the constructivist classroom, the focus tends to shift from the teacher to the learners. The classroom is no longer a place where the teacher as knowledge-expert transmits knowledge to passive, receptive learners. In a constructivist model, the learners are urged to be actively involved in their own process of learning. The teacher functions more as mediator (*see Chapter 3, paragraph 3.4.2*) who prompts and guides learners to develop and assess

their own understanding, and thereby learn to know how best they can learn. In the constructivist classroom, both teacher and learner think of knowledge as dynamic and ever-changing and for that reason innovative thinking is fostered.

Killen (2007: 5, 7-10) mentions some of the characteristics of a constructivist classroom which can be listed as follows:

- The learners are actively involved.
- A democratic teaching-learning environment is evident.
- The activities are interactive and learner-centred.
- The teacher facilitates a process of learning in which students are encouraged to be responsible and autonomous.
- The pursuit of learner questions and interests is valued.
- Learning materials include primary sources and manipulative materials.
- Learning is interactive, building on what the learner already knows (prior knowledge).
- Teachers follow a mediating process to guide learners to construct their own meaning of concepts and content.
- The teacher's role tends to be interactive, therefore rooted in negotiation.
- Assessment includes learner work, observations and points of view, as well as tasks, projects and tests. Process is as important as product.
- Knowledge is seen as dynamic and ever changing with our experiences.
- Collaboration between learners in groups is preferable.

Furthermore, in the constructivist classroom, there is a clear emphasis on social and communication skills, as well as the exchange of ideas. This is contrary to the traditional classroom in which learners work primarily alone, learning is achieved through repetition, the subjects are strictly adhered to and are guided by a textbook. Some activities encouraged in constructivist classrooms are experimentation, research projects in real world context, activities linked to visual context (films) and class discussions.

### **3.3.2 Dynamic interaction between task, teacher and learner**

A further characteristic of the role of the teacher in the social constructivist viewpoint (*as described in Chapter 2, paragraph 2.7*), is that the teacher and the learners are equally involved in learning, which means that continuous interaction is required. This also means that the learning experience is both subjective and objective and requires that even the teacher's culture, values and background become an essential part of the interplay between learners and tasks in the shaping of meaning.

Henson (2004: 15) states that learners have to be able to question their own understanding and compare their version of the truth with that of the teacher and fellow learners in order to arrive at a new level of understanding. This creates a dynamic interaction between task, teacher and learner. This requires learners and teachers to develop an awareness of each other's viewpoints and then look to own beliefs, standards and values, thus being both subjective and objective at the same time. Scardamalia and Bereiter (2003: 5) contend that this interaction is a process to knowledge building and encompasses the foundational learning, sub-skills and socio-cognitive dynamics pursued in other approaches. The interaction involves making a collective inquiry into a specific topic, and coming to a deeper understanding through interactive questioning, dialogue, and continuous improvement of ideas. The explanation above links to the ideas found especially in social constructivism (*see Chapter 2, paragraph 2.7*).

The teacher becomes a guide and allows learners to take responsibility for their own learning, be involved in planning, reflection and self-assessment – especially where the focus is solely on understanding through collaboration. Depending on a learner's prior experiences, related cases and scaffolding (*see Chapter 3, paragraph 3.4.1*) may be necessary for support. Borich and Tombari (1997: 177-178) argue convincingly that the cultural group in which learners find themselves will also play a major role in the formation of concepts and acquisition of new levels of knowledge. All the pursuits mentioned should advance the current understanding of each learner within a group, at a level beyond their initial knowledge level, and which may result in an advanced understanding of what is known about that topic, concept or idea.



## 3.4 CONSTRUCTIVIST TEACHING STRATEGIES

### 3.4.1 Scaffolding builds learning bridges

Constructivists believe that what learners learn in the classroom will depend to a large extent on what they already know (prior knowledge). In this case the educator needs to try and understand what happens in the learner's mind and scaffolding is therefore one teaching strategy which can be used to help the teacher to understand the way of thinking of a learner (Killen, 2007: 11). Knowing *how* a learner thinks gives a teacher the edge to how the learner will react to questions in the assessment process as well is imperative for the use of *scaffolding* as teaching strategy.

Scaffolding is *in educational terms* a teaching strategy which provides a temporary, supportive and adjustable framework for a learner to be enabled to participate in or complete a task/activity that is beyond the learner's reach. According to Gagnon and Collay (2006: 23-108), scaffolding takes place where a learner encounters difficulties/problems in a particular task or activity. Such a situation will require the intervention by a more knowledgeable person in the learning of the learner to interpret the situation and be able to guide and support the learner to construct a higher level of understanding (Gagnon and Collay, 2006: 23).

Scaffolding as teaching strategy carries learner-centred features due to the interaction and collaboration between teacher (more knowledgeable one) and the learner. Learning happens through scaffolding as a process of support or guidance to construct meaning and knowledge on the basis of existing knowledge. The aim is to develop specific skills and to achieve a higher level of understanding and skill and the outcome would therefore be to achieve a higher level of understanding and skill / to complete successfully.

For Balaban (1995: 52) scaffolding refers to the way the teacher "*guides the learner's learning via focused questions and positive interactions.*" A further discussion of how questions can be used in a constructivist manner to enhance the assessment process will follow in *paragraph 3.5*.

Some key features of scaffolding which can be applied in the teaching-learning situation are as follows:

- Direct or focus the learner's attention to the particular starting point of the task/where to proceed. Teaching takes place through the medium of language and therefore the teacher has to guide the construction of meanings because the learner listening to the teacher may attach a different meaning to the message from that intended by the speaker. The quality of "talk" between the teacher and learner is of extreme significance. It is also essential that the teacher should "tune" in to the learner's present ability or understanding.
- Simplify the task/activity by referring to different steps to follow (making the task/activity easier to complete). The teacher must choose appropriate ways to support/guide the learners which would be suitable for the existing knowledge of the learner.
- Highlight crucial features (i.e. important aspects of the task/activity).
- Act as an external source of information providing additional and/or valuable information to enable the learner to proceed.
- Fill in missing pieces of information that would clarify some steps in the task. The teacher must be aware that the learners are coming to class with different ideas about a particular topic.
- Provide emotional support/verbal or non-verbal reinforcement.
- Allow peer support.
- Interpret the level of knowledge and react accordingly to provide suitable support to guide the learner in the construction of new knowledge. Environmental and social structures do have a great influence on interpretation of content and construction of meaning – especially where learners have limited experience and existing knowledge (Gagnon and Collay, 2006: 23-108).

Language problems, socio-economic problems, attitudes, low levels of motivation, lacking existing knowledge and the contextual influences are all part of the challenges in applying scaffolding effectively in the classroom situation. Scaffolding can especially be used as a tool to overcome the previously mentioned obstacles and to enable a learner to develop a *specific skill, grasp a particular concept or achieve a particular level of understanding*. The evidence that the learner successfully accomplished the skill/ability/knowledge to

complete the task or activity successfully would indicate what level of independent competence is reached.

It appears that there is a link between scaffolding in a simulated teaching environment and the opportunity for problem-solving in a contextualised, real-world situation. Simulation as teaching strategy provides the opportunity for problem-solving and scaffolding and therefore needs to be briefly described.

### **3.4.2 Simulation as discovery learning in action**

In a *simulation*, real circumstances are imitated in the classroom. This has the advantage that learners can work within the simulated situation as if it is the real-life situation (Henson, 2004: 278-280). According to Maley (1997: 159) simulations are events which have “reality of function” and although there is no direct contact with the real world, the simulation must have a structure that includes particular facts and information. The use of “*What if?*”-questions appears to be fruitful in a simulated environment.

Du Plessis et al. (2007: 32) make it clear that simulations are problem-centred and learners should therefore take a simulated situation seriously and assume responsibility for their actions and decisions. The learners therefore experience the reality of the situation, with all rights, privileges, obligations and responsibilities attached to it. This means that a simulation will be the ideal opportunity to practice problem-solving skills. This will further include a process to choose, try, and test some strategies in the simulated environment. The research will focus on how existing knowledge can be used to work with problems in a simulated environment as well as to develop new knowledge by being in the simulated environment to solve the problems set.

In the decision context, simulation also involves the analysis of results of the experiments (as mentioned above), making judgements about how the real situation (to the extent that it is represented by the model) would behave under the experimental conditions, and formulating a plan of action.

The greatest advantage of simulation is that it is true to life. A case study or a role play would include simulations, but not of the environment and the context. They would only simulate the decisions that have to be made in real life, but not the environments and context in which the decisions have to be made (Henson, 2004: 278-280).

### **3.4.3 Problem-solving as teaching strategy**

Killen (2007: 218-219) cautions that using problem-solving as teaching strategy should be distinguished from teaching how to solve problems, for instance “word sums” in mathematics. Using problem-solving as teaching strategy is also not the application of a problem-solving model as described by Kirkley (2003: 3-7). The application of such a model may include the ideas from the 1960s and 1970s to define the problem, explore the solutions, act on strategies and investigate effects of the decision as more current views that problem-solving includes a complex set of cognitive, behavioural and attitudinal components (Kirkley, 2003: 4).

Mayer (1998: 53) emphasizes that a meta-skill-based approach is needed in using problem-solving as a teaching strategy. This implies that context-based teaching is important to ensure that learners can *learn from problem-solving*, rather than only knowing how to solve problems. If the teacher merely teaches learners how to solve problems, they do not learn much more than knowing how to apply a sequence of steps in order to solve a very specific type of problem, but if the teacher restructures a problem to place an emphasis on the learners exploring all aspects of the problem (rather than finding the “answer”) these learners are more likely to develop an understanding of the principles and concepts embodied in the problem (Mayer, 1998: 55). Killen (2007: 220) rephrases the need to “*learn from problem-solving*” in his explanation that through problem-solving as teaching strategy the emphasis is on “developing new knowledge *through* solving problems”.

Switching between the parts of a problem, intermediate aspects and the final goal as required in the problem, reminds one of Gagné’s (1985: 178, 179) definition of problem-solving as the “synthesis of other rules and concepts into higher order rules which can be applied to a constrained situation”(see also Chapter 3, paragraph 3.3.2). Gagné (1985:

187-190) is of opinion that the instruction in problem-solving needs to focus on both declarative and procedural knowledge in order to really be effective. Although Gagné follows a cognitivist approach, his reference to declarative knowledge is of significance in the application of problem-solving as a teaching strategy, especially because declarative knowledge is closely related to context knowledge, which research identified to be the most critical feature of skill in problem-solving.

Kirkley (2003: 5, 6) contends that current research supports problem-solving as a situational and context-bound process that depends on the deep structures of knowledge and experience. Learners should therefore be aware of the different parts of the particular problem and be aware of when and how to use the skills in a particular context. Moreover, it means that to improve a problem-solving skill, learners need to develop a stronger base of declarative knowledge, synthesise their knowledge into an appropriate model and be able to recognize common solution strategies across many problems and contexts. In other words this means that problem-solving can be used as a teaching strategy for expanding learners' knowledge and understanding of content, developing their thinking skills and encouraging them to be metacognitive.

#### **3.4.4 Discussion as a teaching strategy**

A *discussion* fulfils various aims of the teaching-learning process. Some of these aims relate to obtaining knowledge, acquiring skills and attitudes, while others relate to motivation and personal satisfaction which arise through discussion. It is not only the teacher who takes action, but also the learners. Killen (2007: 133) describes discussion as the art of co-operative thinking done aloud and the exchanging of ideas. The intention of a discussion is not to provide information, but rather to exchange knowledge and understanding. It appears that learners can be motivated and encouraged through a discussion to critically analyse assumptions, achieve creative solutions to problems and even to develop co-operative skills. The teacher can use a discussion to involve learners in objective, informed and reflective thinking.

Newby (1992: 92-94) claims that learners often learn more from their fellow learners in a lively discussion between the group members than from a teacher's explanation of

concepts. For a discussion to be successful, the learners have to understand that the discussion should be purposeful, they have to exchange ideas and facts in a structured and systematic manner and share their opinions to really have a good discussion about particular concepts (Killen, 2007: 133-134). Newby (1992: 92-94) recommends asking questions in random order in a group to encourage good discussion and not in the order in which the learners are sitting. Asking the learners randomly keeps everyone on their toes, because no one knows who is going to be asked next, so that the so-called “creeping death approach” which often creates tension for the learners sitting at the end of a row is eliminated.

The discussion method can be regarded as a variation of the lecture method, during which the provision of information is combined with the discussion of it (Nieman and Monyai, 2006: 28). It is therefore not only the educator who is taking action, but also the learners. Through discussions the aims of the educator relate to obtaining knowledge, acquiring skills and attitudes, while others relate to motivation and personal satisfaction, which arise through discussion (Killen, 2007: 132-137).

The reason why discussion is included as a teaching strategy in the study is that learners not only receive information, but the discussion itself can motivate learners to develop co-operative skills, encourage critical analysis of assumptions and attitudes and stimulate creative solutions.

### **3.5 THE USE OF A TAXONOMY IN ASSESSMENT**

Nitko (2004: 24) warns that a taxonomy must not assumed to be a teaching hierarchy through which for instance firstly “knowledge” ought to be taught and then “comprehension”. The teacher can use a taxonomy to set learning targets and write learning outcomes and then use these as assessment criteria. This can be accomplished by being sure that outcomes or criteria include an action verb that specifies learner performance.

Although there are many variations of taxonomies, special reference will be made to the 1956-version of Bloom’s taxonomy, the 2001-revised version of Bloom’s taxonomy as

well as Gagné's taxonomy of learning outcomes. The cognitive domain enjoyed preference over the years, but for the purpose of this study the impact of the affective and psychomotor domains are also investigated.

### **3.5.1 Bloom's 1956 taxonomy**

As mentioned in *Chapter 1, paragraph 1.5.10*, Bloom (an educational psychologist at the University of Chicago) published the *Taxonomy of Educational Objectives*, generally known as *Bloom's Taxonomy*, which is a classification of the different learning objectives into three domains of learning:

- *Cognitive* – referring to thinking and mental skills;
- *Psychomotor* – referring to physical activities or manual skills; and
- *Affective* – referring to experiences, feeling, emotions or particular attitudes (Borich and Tombari, 2004: 47).

Currently, educators also refer to these three domains as knowledge, skills and attitudes. Bloom based his ideas on Morrison's idea on learning mastery in the 1930s. Saettler (1990: 288 , 289) explains that the Morrison formula included pretesting, teaching, testing the result, adapting procedures, teaching and testing again to the point of genuine learning. The concept of "mastery learning" assumes that all learners can master the materials presented in the lesson. Bloom adapted and extended these because he argued that mastery learning is more effective for the lower levels of learning and thinking and not appropriate for higher levels of learning and thinking (Saettler, 1990: 289-294).

Bloom's taxonomy provides a structure in which to categorize instructional (teaching) outcomes and instructional assessment. The core reason for his design of the taxonomy was to help teachers and instructional designers to classify instructional objectives and goals. The taxonomy relies on the idea that not all learning objectives and outcomes have equal merit. For example, memorization of facts, while important, does not equate to the learned ability to analyze or to evaluate. In the absence of a classification system (a taxonomy), teachers as instructional designers may choose, for example, to emphasize memorization of facts (which makes for easier testing) rather than emphasizing other (and probably more important) learned capabilities. Bloom's taxonomy, in theory, helps

teachers better prepare outcomes (objectives) and, from there, derive appropriate measures of learned capability and higher order thinking skills (Fahy, 1999: 43).

Like other taxonomies, Bloom's is hierarchical. This means that learning at the higher levels is dependent on having attained prerequisite knowledge and skills at lower levels. Most references to Bloom's taxonomy only notice the cognitive domain. In this study, the focus is rather on all three domains, creating a more holistic view of teaching and assessment.

### **3.5.2 The cognitive domain of thinking in different taxonomies**

Bloom et al. (1956: 201-207) addresses the cognitive domain of knowledge. For Bloom the cognitive domain deals with a learner's ability to process and utilize (as a measure) information in a meaningful way. This means that the cognitive domain involves working with knowledge and developing intellectual skills, which includes the recall or recognition of specific facts, procedural patterns, and concepts that serve in the development of intellectual abilities and skills. There are six major categories, starting from the simplest behaviour to the most complex, namely knowledge, comprehension, application, analysis, synthesis and evaluation. The categories can be thought of as degrees of difficulty, which implies that the first one must be mastered before the next one can take place (Borich and Tombari, 2004: 47-49).

Bloom outlines the following cognitive activities organized from least to greatest complexity: Skills in the *cognitive domain* revolve around knowledge, comprehension, and "thinking through" a particular topic. Traditional education tends to emphasize the skills in this domain, particularly the lower-order objectives.

Fahy (1999: 42-43) finds Bloom's taxonomy quite similar to *Gagné's hierarchy of intellectual skills (1962)* which includes *verbal information, intellectual skills, cognitive strategies, and attitude and motor skills*. The last two categories resemble the affective and psychomotor domains developed by Bloom and associates. The first four encompass learning types that are both similar to and different from Bloom et al.'s cognitive domain.



A summary of Gagné's Taxonomy of Learning (Gagné, 1985: 47-66), as described by Borich and Tombari (2004: 54-57) appears in *Table 3.1*. Examples included in the table illustrate how each learning outcome appears in the practical teaching-learning situation as well as how each learning outcome translates in planned learning conditions.

**Table 3.1: Gagné's taxonomy of learning outcomes**

<b>Taxonomy of Learning Outcomes</b>	<b>Example</b>	<b>Planned Learning Conditions</b>
<b>Verbal Information</b>	Stating previously learned materials such as facts, concepts, principles, and procedures, e.g., knowing the names of explorers, dates, dates, definitions and the letters of the alphabet. Also to state a rule.	<ul style="list-style-type: none"> <li>• Draw attention to distinctive features by variations in print or speech.</li> <li>• Present information so that it can be formed into chunks.</li> <li>• Provide a meaningful context for effective encoding of information.</li> <li>• Provide cues for effective recall and generalization of information which are building blocks for the development of concepts, rules and generalizations covered in the intellectual skill category.</li> </ul>
<b>Intellectual Skills:</b> Discriminations, Concrete Concepts, Defined Concepts, Rules, Higher Order Rules	<p>Involve making discriminations: Being able to recognize one thing to be different from another by distinguishing objects, features, or symbols, e.g., hearing different pitches played on a musical instrument.</p> <p>Concrete Concepts: Identifying classes of concrete objects, features or events, e.g., picking out all the green Smarties from the candy jar.</p> <p>Defined Concepts: classifying new examples of events or ideas by their definition, e.g., noting "she sells sea shells" as alliteration.</p> <p>Rules: Applying a single relationship to solve a class of problems, e.g., calculating the earned run averages (ERA) of the South African cricket team</p> <p>Generalizations or Higher Order Rules: Applying a new combination of rules to solve a complex problem, e.g., generating a balanced budget for a state organization.</p>	<ul style="list-style-type: none"> <li>• The ability to make discriminations is a prerequisite to the ability to form concepts.</li> <li>• Call attention to distinctive features.</li> <li>• Stay within the limits of working memory.</li> <li>• Stimulate the recall of previously learned component skills.</li> <li>• Present verbal cues to the ordering or combination of component skills.</li> <li>• Schedule occasions for practice review.</li> <li>• Use a variety of contexts to promote transfer.</li> <li>• Generalisations and application: working with laws of supply and demand, gravitational forces, principles that apply to the rise and fall of civilisations or working with laws to explain geological events.</li> </ul>

<b>Cognitive Strategies</b>	Employing personal ways to guide learning, reading, thinking, acting, writing and solving problems that are beyond immediate requirements of the task, e.g., devising a corporate plan to improve customer relations.	<ul style="list-style-type: none"> <li>• Application requires prior learning of certain intellectual skills.</li> <li>• Describe or demonstrate the strategy.</li> <li>• Provide a variety of occasions for practice using the strategy.</li> <li>• Provide informative feedback as to the creativity or originality of the strategy or outcome.</li> </ul>
<b>Motor Skills</b>	Executing performances involving the use muscles, e.g., doing a triple somersault dive off the high board.	<ul style="list-style-type: none"> <li>• Present verbal or other guidance to cue the executive subroutine.</li> <li>• Arrange repeated practice.</li> <li>• Furnish immediate feedback on the accuracy of performance.</li> <li>• Encourage the use of mental practice.</li> </ul>
<b>Attitudes</b>	Choosing personal actions based on internal states of understanding and feeling, e.g., deciding to exercise daily as a part of preventive health care.	<ul style="list-style-type: none"> <li>• Establish an expectancy of success associated with the desired attitude.</li> <li>• Assure student identification with an admired human model.</li> <li>• Arrange for communication or demonstration of choice of personal action.</li> <li>• Give feedback for successful performance; or allow observation of feedback in the human model.</li> </ul>

Summarised from source: Gagné, R.M. 1985. *The conditions of learning and theory of instruction*, pp.89 – 242.

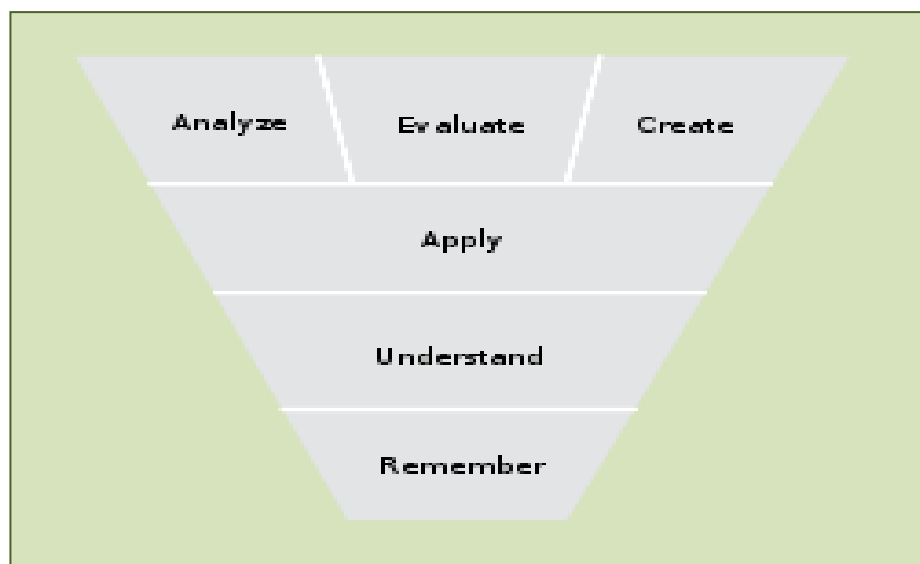
In addition to Bloom and Gagné, various other instructional theorists have proposed taxonomies of learning in the *cognitive domain*:

- Ausubel (1968: 18-24) distinguishes between *rote learning*, in which “learned materials” are discrete and relatively isolated entities which are only relatable to cognitive structure in an arbitrary, verbatim fashion, not permitting the establishment of relationships; and *meaningful learning*, which “takes place if the learning task can be related in non-arbitrary, substantive fashion to what the

learner already knows, and if the learner adopts a corresponding learning set to do so”.

- Anderson (1983: 23-215) distinguishes between *declarative knowledge*, which according to Anderson comes in chunks or “cognitive units” such as propositions, strings or even spatial images; and *procedural knowledge*, which is the knowledge about how to do and apply.
- Merrill (1983: 302-305) proposed the following taxonomy:
  - *Remember verbatim*: literary storing and retrieving of information
  - *Remember paraphrased*: integration of ideas into associative memory
  - *Use a generality*: use a general rule to process specific information
  - *Find a generality*: the learner finds a new generality or a higher-level process.

The revised version of Bloom’s taxonomy as published by Anderson and Krathwohl in 2001, reflects the changed reflection on thinking and learning since the original 1956-version of Bloom’s ideas on higher order learning and thinking. This revised taxonomy attempts to correct some of the problems with the original taxonomy. One of these was to move “synthesis” higher up in the order than “evaluation” and to refer to the ability to synthesise as “create”.



**Figure 3.2: Categories in the cognitive domain of Bloom's taxonomy as revised by Anderson and Krathwohl (2001)**

The cognitive dimension of Bloom's revised taxonomy (like the original version) has six skills. They are, from simplest to most complex: remember, understand, apply, analyze, evaluate, and create.

- **Remembering (knowledge/basic conceptual knowledge):** consists of recognizing and recalling relevant information from long-term memory.
- **Understanding (comprehension):** the ability to create your own meaning from educational material such as reading and teacher explanations. The sub-skills for this process include interpreting, exemplifying, classifying, summarizing, inferring, comparing and explaining.
- **Applying:** using a learned procedure either in a familiar or new situation.
- **Analysis:** breaking knowledge down into its parts and thinking about how the parts relate to its overall structure. Learners analyze by differentiating, organizing, and attributing.
- **Evaluation:** includes checking, critiquing and giving own opinions.
- **Creating (Synthesis):** (the highest component of the new version) to accomplish creating tasks; learners generate, plan and produce.

According to this taxonomy, each level of knowledge can correspond to each level of cognitive process, so a learner can remember factual or procedural knowledge, understand conceptual or metacognitive knowledge, or analyze metacognitive or factual knowledge. Anderson and Krathwohl (2001) argue that meaningful learning provides learners with the knowledge and cognitive processes they need for successful problem solving. The broader range of factors that have an impact on teaching and learning, namely the feelings and beliefs of learners and teachers, as well as the social and cultural environment of the classroom, are also taken into account.

Unlike the 1956 version, the 2001 revised taxonomy differentiates between “*knowing what*,” the content of thinking, and “*knowing how*,” the procedures used in solving problems. The knowledge dimension is the “*knowing what*.” It has four categories: *factual*, *conceptual*, *procedural*, and *metacognitive*. Factual knowledge includes isolated bits of information, such as vocabulary definitions and knowledge about specific details. *Conceptual knowledge* consists of systems of information, such as classifications and categories. *Procedural knowledge* includes algorithms, heuristics or rules of thumb,

techniques, and methods as well as knowledge about when to use these procedures. *Metacognitive knowledge* refers to knowledge of thinking processes and information about how to manipulate these processes effectively.

### 3.5.3 The affective domain

Skills in the **affective domain** describe the *emotional reaction* and the ability to experience for instance empathy or joy. Affective objectives typically target the awareness and growth in *attitudes, emotion, interests, dispositions and feelings* (Nitko, 2004: 22).

Borich and Tombari (2004: 49-51) state that the Krathwohl, Bloom and Masia (1999) taxonomy has five levels of affective behaviour, ranging from the receiving level to the characterization level. As in the cognitive domain, these levels are presumed to be hierarchical – where higher level objectives are assumed to include and to be dependent on lower level affective skills. The higher levels require more involvement, commitment and the reliance on the “self” of the learner as opposed to the impact or influence of external feelings and attitudes on the learner.

- *Receiving*: The lowest level of being conscious of something. On this level the learner passively pays attention to an object or state of affairs. The receiving level can be described as firstly an awareness, then a willingness to receive and then controlled or selected attention. Some action words describing outcomes at the receiving level are attend, listen, look, be aware, notice.
- *Responding*: The learner actively participates in the learning process, not only attends to a stimulus; the learner also reacts in some way. Objectives at the responding level require the learner to comply with given expectations by attending or reacting to certain stimuli. Some action words that describe outcomes at the responding level are comply, follow, practice, discuss, participate.
- *Valuing*: The learner attaches a value to an object, phenomenon, or piece of information. In valuing, the learner is expected to demonstrate a preference or display a high degree of certainty. The action words linked to the valuing level are debate, display, express an opinion, argue.

- *Organising*: The learner can put together different values, information, and ideas and accommodate them within his/her own schema; comparing, relating and elaborating on what has been learned. This level requires a commitment to a set of values. Learners are expected to organise their likes and preferences into a value system and then decide which are dominant. The action words linked to the organising level are for instance compare, formulate, decide on, define, select.
- *Characterising*: The learner holds a particular value or belief that now exerts influence on his or her behaviour so that it becomes a characteristic (Borich and Tombari, 2004: 49, 50; Nitko, 2004: 29, 463).

In the five categories of the affective domain, some sub-categories seem to describe the affective reaction of the learner. These sub-categories appear to describe the level in which a learner will respond or value a particular object in showing for instance an acceptance of a value statement, a preference for such or showing full commitment to an object or phenomenon. The researcher found that some learning targets which are attached to the particular categories in the affective domain, describe fields of study or subjects, for instance to develop an awareness of aesthetic factors in architecture (receiving level) or to find pleasure in reading for recreation (responding level).

#### **3.5.4 The psychomotor domain in different taxonomies**

Bloom and his colleagues never created sub-categories for skills in the psychomotor domain, but other educators have created their own psychomotor taxonomies. Simpson (1972) in his "*The Classification of Educational Objectives in the Psychomotor Domain*", Dave (1975) in his "*Developing and Writing Behavioural Objectives*" as well as Anita Harrow (1972) in her "*A Taxonomy of Psychomotor Domain: A Guide for Developing Behavioural Objectives*. New York" all added sub-categories.

**Table 3.2: Summary of the psychomotor domain as seen by Simpson (1972), Harrow (1972) and Dave (1975)**

<i>Simpson (1972)</i>	<i>Anita Harrow (1972)</i>	<i>Dave (1975)</i>
<b>Origination:</b> Creating new movement patterns to fit a particular situation or specific problem. Learning outcomes emphasize creativity based upon highly developed skills.		
<b>Adaptation:</b> Skills are well developed and the individual can modify movement patterns to fit special requirements.		
<b>Complex Overt Response:</b> The skilful performance of motor acts that involve complex movement patterns. Proficiency is indicated by a quick, accurate, and highly coordinated performance, requiring a minimum of energy. This category includes performing without hesitation, and automatic performance. For example, players often utter sounds of satisfaction or expletives as soon as they hit a tennis ball or throw a football, because they can tell by the feel of the act what the result will produce.	<b>No discursive communication:</b> Effective body language, such as gestures and facial expressions.	<b>Naturalization:</b> Having high level performance become natural, without needing to think much about it. <b>Examples:</b> Jonty Rhodes playing cricket, Gary Player hitting a golf ball.
<b>Mechanism:</b> This is the intermediate stage in learning a complex skill. Learned responses have become habitual and the movements can be performed with some confidence and proficiency.	<b>Skilled movements:</b> Advanced, learned movements as one would find in sports or acting.	<ul style="list-style-type: none"> <li>○ <b>Articulation:</b> Coordinating a series of actions, achieving harmony and internal consistency. Example: Producing a video that involves music, drama, colour, sound, for example.</li> </ul>

<p><b>Guided Response:</b> The early stages in learning a complex skill that include imitation and trial and error. Adequacy of performance is achieved by practicing.</p>	<p><b>Physical abilities:</b> Stamina that must be developed for further development, such as strength and agility.</p>	<p><b>Precision:</b> Refining, becoming more exact. Few errors are apparent. Example: Working and reworking something, so it will be "just right."</p>
<p><b>Set:</b> Readiness to act. It includes mental, physical and emotional sets. These three sets are dispositions that predetermine a person's response to different situations (sometimes called mindsets).</p>	<p><b>Perception:</b> Response to stimuli such as visual, auditory, kinesthetic, or tactile discrimination.</p>	<p><b>Manipulation:</b> Being able to perform certain actions by following instructions and practicing. Example: Creating work on one's own, after taking lessons, or reading about it.</p>
<p><b>Perception:</b> The ability to use sensory cues to guide motor activity. This ranges from sensory stimulation, through cue selection, to translation.</p>	<p><b>Reflex movements:</b> Reactions that are not learned. <b>Fundamental movements:</b> Basic movements such as walking, or grasping</p>	<p><b>Imitation:</b> Observing and patterning behaviour after someone else. Performance may be of low quality. Example: Copying a work of art.</p>

As indicated in *Table 3.2*, the psychomotor domain includes physical movement, coordination, and the use of the motor-skill areas. The seven major categories are listed from the simplest behaviour to the most complex. Development of these skills requires practice and is measured in terms of speed, precision, distance, procedures, or techniques in execution. Skills in the *psychomotor domain* describe the ability to physically manipulate a tool or instrument like a hand or a hammer. Psychomotor objectives usually focus on change and/or development in behaviour and/or skills.

Although in most instances the skills linked to the psychomotor domain in all instructional designs, particular subject fields especially in life sciences and general sciences pay particular attention in the practical application of the mentioned skills.

### 3.6 CLASSROOM ASSESSMENT

Walvoord (2004: 2-5) and Lambert and Lines (2000: 4) define the assessment process of how learners learn as the systematic collection of information about the learner's learning,



using the time, knowledge, expertise and resources available in order to inform decisions about how to improve learning. As mentioned in *Chapter 1, paragraph 1.5.9*, the most common assessment purposes according to Borich and Tombari (2004: 1, 43, 44) are to grade, sort, to promote, select or mere evaluate. Walvoord (2004: 3, 6) argues for assessment to be more than gathering evidence of how well the learners achieved outcomes, namely to include the *use of the assessment information for improvement*. In this instance the improvement not only refers to the learners' learning, but also the assessment process and for the teacher to be able to adapt planning for more effective teaching.

For the reasons mentioned above, the focus in this study goes beyond assessment of learners' work only to grade and award a mark, but rather to find and introduce ways to plan and teach to encourage and promote the diagnostic characteristics of assessment, namely to use assessment for guidance and motivation and use assessment for the intent that learning will take place.

### **3.6.1 The purpose of assessment in the classroom**

Borich and Tombari (2004: 1-3) argue strongly that classroom assessment should promote learning, because learning should be the core activity in this teaching-learning environment. The tendency to assign grades rather than to teach, guide and support learning results in assessment being used more for summative purposes, than for formative purposes. The reason for not using formative assessment may well be that teachers misunderstood the assessment process and that formative assessment is not based on valid information on how learning takes place.

In research done by Black, Harrison, Lee, Marchall and Wiliam (2003: 53-57) teachers firstly used formative practices to support revision and develop more effective reviewing strategies in their attempt to get to grips with formative assessment and to steer away from summative assessment. As a second innovation to come to a better understanding of the use of formative assessment, the teachers in the research project done by Black et al. (2003: 54-57) started to involve learners in the assessment process. They then also experience their changed role in summative assessment as grader and evaluator to

mediator, supporter and guide in formative assessment practices. Significantly, as soon as the learners had to set questions and had to think of what makes a good question, they also realise what they need to gain in order to have a deeper understanding of the subject material. Regarding how an assessment process can be changed from a grading exercise to a reviewing, self-reflecting and mediating process, this exercise had an impact on the understanding of both teacher and learner. The teachers gained a much better understanding of how to involve learners in “revision”, and learners didn’t passively revise some subject content which they already know. Answering the questions set by other learners, brought about a new understanding of good questions and how to use them to improve knowledge and understanding of the subject content.

### **3.6.2 A constructive assessment process**

In constructivist teaching and assessment, *the process of gaining and assessing knowledge is* viewed as a process to create and illustrate own understanding as an individual. Lambert and Lines (2000: 2) refer to this view of assessment as “*an organic part of teaching and learning*”; the reason why assessment cannot be separated from the planning process of teaching and the construction of own understanding. The researcher concurs with Lambert and Lines that making connections between assessment and learning encourages a holistic approach to the analysis of assessment and its impact on the teaching-learning process.

Borich and Tombari (2004: 85) identify the role of the teacher in the teaching-learning process as one to monitor knowledge construction, given the fact that learners need to construct their own knowledge networks or domains from classroom and other experiences. This role of the teacher also involves the assessment of prior information, the acquisition of new information and the transformation, elaboration and organization of such new information.

Thinking about the components to include in constructive assessment and which are essential to assess the learner’s individual ability and needs, will explicitly include a set of outcomes and criteria, the use of close-to-reality contexts; ideas about individual formative

feedback (Black et al., 2003: 30-57) and fostering the ability for self-assessment through a mediation process.

### **3.6.2.1 The role of prior knowledge**

Killen (2007: 6, 11) refers to “*total learning*” as learning which is creative, conscious, collaborative and constructive. These features may be linked to total assessment as well. In addition, effective assessment consciously or metacognitively acknowledges prior knowledge. The emphasis on prior knowledge means that the teacher provides learners with a cognitive structure that they can use to make sense of new learning, which is in line with the social constructivist views of culturally and context responsive teaching and learning (*Chapter 2, paragraph 2.7*). Social constructivists are of the opinion that learners synthesise new experiences into what they previously came to understand. In new learning situations, learners are confronted with new perceptions, concepts and data which they interpret in relation to a set of rules or existing understanding (prior knowledge) in order to generate or construct a new understanding. Attitudes, experiences and knowledge are also embedded in prior knowledge which may all be utilized by learners to construct meaning from new content in order to give proof of understanding in an assessment task.

Research by Christen and Murphy (1991) on “*Enriching background knowledge*” has demonstrated that activating prior knowledge increases comprehension. The research has been conducted to determine the value of providing activities or strategies to assist learners to activate their prior knowledge base. The study revealed that when readers lack the prior knowledge to read, three major instructional interventions need to be considered in order for these learners to successfully complete the task. The interventions include the teaching of vocabulary as a pre-reading step, providing experiences and introducing a conceptual framework that will enable the learners to build appropriate background for themselves. This study shows that for a learner to make sense of learning experiences, comprehension is a major factor and prior knowledge serves as a good foundation to and is an essential element in the quest for making meaning.

For assessment practice the findings in the research mentioned above has major implications, such as to establish the level of prior knowledge of learners to align

assessment tasks accordingly. This also implies that a teacher practices effective questioning in order to determine the learners' prior knowledge. The challenge all teachers face is to determine what kind of questions to ask to establish the learners' level of understanding which will also reveal why learners have misconceptions and misunderstandings about particular concepts.

### **3.6.2.2 Validity, reliability and fairness in classroom assessment**

Although Lambert and Lines (2000: 4, 7) identify a formative, summative and certification role for assessment, they make it clear that whatever the use of assessment, it is vital to get correct information about the learner from the assessment process, which they refer to as "confidence in the result". Lambert and Lines (2000: 7) argue convincingly that, although validity and reliability in assessment are two separate concepts, they are closely interconnected. For this reason the discussion to follow will deal with both concepts, as they are interconnected.

Any consideration of how to assess learners equitably should also include questions about what abilities learners require in order to demonstrate knowledge in and skills pertaining to particular learning outcomes. Besides required skills, one can argue in a constructive sense that in order for assessment to be valid, the learner as an individual in a particular social setting and context should be kept in mind. According to Killen (2007: 333) such an individualized assessment practice will allow the teacher to make more informed decisions on what to teach and how to reduce the inequalities which may appear in the assessment process.

Nitko (2004: 36-45) points out that validity does not only refer to the use of assessment results but also the planning and intention of the assessment when one has a constructive assessment process in mind. The planning will include the acknowledgement of the learner who needs to achieve particular learning targets and outcomes in a particular context. Nitko (2004: 36) claims that a taxonomy may not only be a useful tool to structure the assessment, but may also be a powerful way to increase the validity of the assessment task by revealing the types of cognitive demands required to perform the tasks successfully. For the sake of validity, the teacher should also ensure that the assessment

tasks reflect the relevancy and coverage of content as well as the depth in which content was dealt with.

It appears that if validity is considered to be the extent in which an assessment task assesses what it intended to assess or measure, the consideration or non-consideration of the context, learner abilities, culture, prior knowledge and existing knowledge frameworks will influence the intended assessment a great deal.

Fairness in assessment with the main focus on equity (fairness and justice), rather than equality (equal opportunity), allows for differences in the learners' backgrounds which could include cultural heritage, language proficiency, interest, prior knowledge and learning styles to be acknowledged in assessment practices (Killen, 2007: 331). This approach will result in the use of different kinds of assessment to assess abilities, which may mean for instance that the quality of expression may be ignored when language skills per se are not assessed. Equity implies that every learner must have an opportunity to learn the important knowledge and skills that are assessed. This further implies that learners cannot be assessed fairly on content that they have not had the opportunity to learn. In such a situation the assessment will neither be fair, nor valid.

Assessment which proves to be unfair or bias will influence the stability of this assessment and will therefore also not be reliable enough to consistently result in comparable levels of performance.

### **3.6.2.3 The outcomes – assessment criteria link in assessment practice**

The reference to fair assessment also includes the provision that the planning, teaching and assessment should start with a clear set of outcomes. Killen (2007: 329, 335) states that alignment of assessment tasks with the outcomes will ensure that the teacher will only assess which can be defined. The teacher's attempt to assess learners' understanding may refer to the capacity to use explanatory concepts creatively, or the capacity to think logically or to tackle new problems or the ability to re-interpret objective knowledge. What this means in practice is that the teacher has to anticipate what type of learning should occur and then write and structure the required achievements in the form of statements (outcomes). These

outcomes provide an opportunity to the teacher to reconsider whether the outcomes are appropriate, that is, whether they suit the particular content and concepts.

Using the outcomes to set assessment criteria, gives all learners equal opportunities to demonstrate how well they have achieved the outcomes. Criteria serve to be a well-defined standard according to which a learner's performance can be compared. This means that clear criteria are described and defined to indicate what level of achievement is for instance worth an "A", and what is worth a "B". The focus in this case is on what a learner can in fact do and the skills the learner has mastered.

Assessment criteria should be *explicit*, which means that every learner should be able to understand how his/her work is going to be assessed. Similarly, every teacher should be able to explain results with reference to the stated criteria. Giving learners an opportunity to ask questions in order to clarify the criteria and to know exactly what is expected of them in the assessment task, will ensure that learners know how to attempt different types of assessment successfully.

#### **3.6.2.4 The diagnostic character of constructivist assessment**

A common form of constructive assessment is "*diagnostic assessment*" which measures a learner's current knowledge and skills, but will also provide the teacher with an understanding of the existing and prior knowledge and skills a learner brings to the teaching-learning environment. Any problems identified in the assessment will infer further planning and the adaption and modification of the teaching of content and concepts to follow (Leighton and Gierl, 2007: 3). This clearly shows that there is an overlap between formative and diagnostic assessment.

Nitko (2004: 288-290) explains that diagnostic assessment should be clearly linked to pre-determined learning outcomes (objectives) in order to assist the learner in the steps to follow in the learning process. This means that learners should understand *why and how* they are going to be assessed. Furthermore, diagnostic assessment may be used to assess key skills taught in the curriculum or it may assess key skills of a more basic or absolute nature, which the curriculum is expected to develop.

Diagnostic assessment is conducted prior to and during teaching and learning, *not only* to determine what existing knowledge, skills, attitudes, interests, and/or needs the learner has, but to identify the range of *individual differences* and then to modify the teaching instruction to meet the needs of individuals or even groups of learners. Some recommendations regarding the application of diagnostic assessment follows in *Chapter 6*.

### **3.6.2.5 The formative characteristic of constructivist assessment**

It is imperative to clarify the understanding of what formative assessment is. To some, “formative” has in the past implied the collection of marks from homework tasks and from class tests, as opposed to marks from formal testing which left the misconception of formative assessment to be frequent informal testing. Black et al. (2003: 122) clear this misunderstanding by defining formative assessment to be *a process*, one in which information about learning *is evoked* and then *used to modify* the teaching and learning activities in which teachers and learners are engaged.

Black and Wiliam (1998a: 139-148) refer to assessment as all the activities undertaken by teachers and learners in assessing themselves which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged. They are of opinion that assessment becomes “formative assessment” when the evidence is *used to adapt the teaching in order to meet the needs*. This evidence Black and Wiliam (1998a: 139-148) are referring to, can be evoked in a wide variety of ways, from the puzzled look of a learner to an analysis of a learner’s response to a formal test. The crucial fact regarding the evidence is that the teacher should be able to use the evidence in a process to guide the learner to improved understanding, improve the quality of teaching and increase the efficacy of assessment.

## **3.7 CONCLUSION**

In *Chapter 2* the focus fell on approaches on learning, whereas *Chapter 3* served as a literature review on the views on instructional design and assessment practice. The overview on the behaviourist and cognitivist views framed the rest of the discussion on the

characteristics of constructivist views as well as the nature of and methods associated with constructivist teaching strategies. The second part of this chapter was linked to the use of a taxonomy in assessment and the purposes of assessment in the teaching-learning situation. The researcher made introductory comments about the interrelation between the cognitive and affective domain and the importance of equilibrium between the two domains in order for the most effective teaching to occur. This concept will be further clarified in *Chapter 6* where ideas about and suggestions for a constructive instructional design and assessment practice will follow.



## **4. CHAPTER 4: RESEARCH DESIGN**

### **4.1 INTRODUCTION**

*Chapters 2 and 3* served as theoretical background to the research and contained a survey of the literature consulted for the research under review. In *Chapter 2* the learning theories according to the behaviourist and cognitivist views and constructivism served as background information to substantiate the focus on the impact of constructivism by referring to the views of Bruner, Piaget, Vygotsky and Feuerstein. The literature study provided more insight into how the learning process and a process of change according to the constructivist view can bring about a new understanding and deeper thinking. In *Chapter 3* the researcher further reviewed the impact of learning approaches on instructional design and assessment practices.

Clarity regarding the critical elements of a qualitative research design are vital to ensure that the study is grounded, justified and valid. The attention to qualitative research is required because, as indicated in *Chapter 1*, this method will be used to investigate in what manner the constructivist approach impacts on instructional design and assessment practices. The design of the research under review was outlined very briefly in *Chapter 1* and will be treated in much more detail in this chapter.

### **4.2 RESEARCH DESIGN**

Some define “research design” as a blueprint or detailed plan for how the research study is to be conducted and others expand the definitions by adding that the plan is to collect data and to investigate the research hypothesis (Thyer, 1993: 94; Huysamen, 1993: 10). Cohen, Manion and Morrison (2002: 73) argue compellingly that the research design is governed by the notion of fitness for purpose; therefore there cannot be an equal blueprint design for all research. What can be identified is a set of issues that the researcher needs to address in order for the research to be practicable, feasible and able to lead to enhancing the practice. Henning et al. (2004: 36) underline the “fit for the purpose” idea by stressing that the researcher has to match the design, methodological requirements and the processing of

data implied by the research question. One important aspect for McMillan and Schumacher (1997: 34) is that the researcher should use the research plan to obtain evidence from which valid answers to research questions can be construed.

To really obtain valid evidence, setting up the research requires harmonizing of planned possibilities for the specific research, workable, coherent practice to lead the researcher to the convergent phase of the research to arrive at the action plan that can realistically be operated. In order to harmonize the plan, McMillan and Schumacher (2006: 22) suggest that the researcher stipulates in detail the when, by whom and under what circumstances the data will be obtained and what methods of collection will be used.

#### **4.2.1 Qualitative research design**

Nieuwenhuis (2007: 65), Cooper and Schindler (2006: 143, 196), Leedy and Ormrod (2005: 133), Patton (2002: 39) and Neuman (2000: 123, 126) define qualitative research as an interpretative, constructivist, naturalistic or post-positivistic approach to subject matter, a field or to reality. They further describe the role of the researcher in qualitative research as one to describe patterning characteristics of generalizations of people or events in reality in an attempt to reach an in-depth understanding of the subject matter or field or to be able to interpret a social phenomena or particular experiences and views of participants.

McMillan and Schumacher (2006: 315) emphasize the fact that the researcher has to interpret the phenomena in terms of the meaning that people assign to them. The interpretations should result in meticulous descriptions in narrative form to present a coherent and consistent picture. Cooper and Schindler (2006: 198) agree that the researcher would seek to develop a deeper understanding through the narration of the data collected. The narrative of the collected data can then be used to develop concepts and theories which enable a better understanding of the social reality related to the particular study. New emerging theory that may form the basis for further study can also be developed.

The qualitative research design in this investigation as described in *Chapter 1, paragraph 1.6* is based on a constructivist philosophy that assumes reality is a multi-layered,

interactive shared social experience that is interpreted by individuals (McMillan and Schumacher, 2006: 315). The reality referred to in this investigation is that the educational situation serves as a social construction where teachers who are involved in further study for the sake of professional upgrading ascribe meaning to concepts, events and processes. The constructions formed about concepts and processes will become part of their knowledge and beliefs. This appears to be valuable in the investigation to find the participants' ideas, interpretation of concepts, meaning given to approaches, feelings, knowledge and practical application of instructional design and assessment practices. The educational background of the participants in this study represents a multi-layered and multi-dimensional culture, home-language, teaching-learning environment and social strata. Although the reality of the participants is so multi-layered, they shared the interactive social experience of further study in a professional upgrading programme which allows the same exposure to new knowledge of a constructivist approach and the possible application value thereof in their instructional design (planning for teaching) and assessment practice. In this way the researcher followed an inductive approach to construct meaning out of the different ways the participants expressed their views, feelings, understanding and even fears. The researcher could inductively construct meaning and could use the data towards the development of new theory.

Nieuwenhuis (2007: 58), Cooper and Schindler (2006: 139, 140) and Neuman (2000: 123, 126) confirm that the use of communication techniques in qualitative research is an ideal medium to exact feelings, opinions, motivations and meanings to concepts and particular perceptions. These direct encounters with individuals may be through one to one interviews, group interviews or by observation. In this investigation the communication between researcher and participants was through focus group discussions and a whole group discussion on open questions posed to the participants. These opportunities for communication supplied the researcher with the meaning the participants attach to concepts like "approach", "theoretical framework", "structure and planning for teaching", "assessment practice" and "formative feedback".

The researcher experienced making sense of, understanding and the interpretation of the "created context" in which the communication between researcher and participants took place as a cyclical process of receiving data, sharing ideas, interpreting the

communication on the grounds of the participants' own context and preparing again to receive new information and data. Nieuwenhuis (2007: 58) explains this cyclical process of understanding and interpretation of the context as the hermeneutic character of qualitative research in which the interpretation of parts of the data should be understood in view of the whole to arrive at a holistic view. This cyclical process also implies that data collection, processing, analysis and reporting are intertwined and not merely a number of successive steps.

Nieuwenhuis (2007: 100) refers to the three elements of this cyclical process as noticing, collecting and reflecting on the data collected. In this investigation significant aspects were revealed which were used in follow-up questions to the participants during the focus group discussions. The information, the misinterpretation of concepts and a lack of understanding were included in the first contact session for the module *Classroom Assessment (EDUC2002)* as well as in preparation for the open questions for Stage 2 of the investigation. What was seen (also responses in body language) and what was heard in terms of common words, phrases, ideas and patterns that would aid the interpretation of what was emerging in the study was summarised. The researcher kept in mind that the aim of qualitative research is to interpret, make sense of and arrive at a particular understanding and not to measure – a process which the researcher experienced to be creative, but a process which also requires a lot of discipline, planning and following a systematic approach.

The communication opportunities in the focus group discussions and the whole group discussion supplied the researcher with answers to the “what”, “how” and “why” – questions usually associated with an exploratory method in qualitative research (Cooper and Schindler, 2006: 139, 140; Neuman, 2000: 21). In this investigation the researcher looked for answers regarding the meaning the participants attached to particular concepts such as “an approach”, “theoretical framework” and “purpose of assessment”. Furthermore how the participants plan for teaching, how they prepare assessment tasks, give feedback to learners, why they express particular feelings of motivation or a lack thereof, and why they apply assessment practice in the way they do were investigated. In essence the investigation focused on how the participants apply a constructivist approach

in their teaching and what impact constructivist ideas have on instructional design and assessment practice.

The researcher is of opinion that finding the “objective truth” that is unaffected by researchers’ personal interests, beliefs and values appears to be impossible in qualitative research. In this regard Johnson (1997: 281) argues that “finding truth” should rather be described as finding sustained trustworthiness in the findings. It appears that subjectivity is inevitable in the choice of questions, the interpretation of data, participation in communication and the researcher’s personal relationship as well as professional and emotional connection with the participants and field of study. The researcher therefore concurs with the opinion Leedy and Ormrod (2005: 133) hold that the researcher in qualitative research is a medium to interpret the social phenomena and the field of investigation in an attempt to understand participants’ views, ideas, perspectives and feelings. According to them an objective approach in qualitative research is not possible or even desirable.

Qualitative research may be criticized due to a lack of objectivity and “generalisability” as in what degree the findings can be generalised from the study sample to the entire population. Myers (2000) argues that while qualitative research may not be “generalisable” in the traditional sense of the word, there are still redeeming features which make the findings from a qualitative study very valuable in the education community. Regarding the “generalisability” of qualitative research Johnson (1997: 283) claims that the more the trustworthiness (validity) can be maximised, the more credible and defensible the result would be and that may lead to generalisability (*see also paragraph 4.8 regarding validity*). The researcher reiterates what was mentioned in *Chapter 1, paragraph 1.6*, namely that some of the greatest strengths of the qualitative approach are the richness and depth of explorations and descriptions and findings in qualitative research. These descriptions may fully meet the demands of justification – not because they are logical, predict outcomes or are a form of *a priori* truth, but that meaning and understanding are discovered to enhance the phenomena under investigation.

Myers (2000) is then correct in arguing that qualitative research is based on its own specific epistemological foundations and has its own perspective on ways to contribute

knowledge to the community and to society. In this study the application of the findings could have a triangulation effect on the teaching-learning environment by finding constructivist ideas to enhance the ways learning takes place, and to improve both the quality of instructional design and the efficacy in assessment practice.

Holistic by nature, qualitative research is concerned with human beings in all their complexities, it always includes an element of time and the contact is personal, lengthy, and there may be multiple meetings with participants. Although the collection of qualitative data is an intensive, time-consuming task, the eleven months of this qualitative investigation allowed the researcher to build collaborative and trusting relationships with the participants as is further explained in *paragraph 4.4.3* below. For most of the participants it was a first to voice their understanding of educational concepts, but even more to voice their fears, feelings and daily experiences of planning, preparation, teaching and assessment in an honest way.

The research questions, aims and objectives were constantly kept in mind throughout the qualitative investigation. Consequently, some of the findings from the focus group discussions could be used to enhance the contact programme for the module *Classroom Assessment (EDUC2002)*.

#### **4.2.2 Action research**

As stated in *Chapter1, paragraph 1.6.2.1*, action research is most applicable in this study. This study is focused on instructional design (planning) and assessment practices to bring about change. Therefore, the research involves participation, is an interactive form of knowledge development, it is practical and involves a cyclical process that will include the feelings expressed and the meaning and interpretations that the participants give to the teaching-learning situation. These are characteristics also described by Ebersohn, Eloff and Ferreira (2007: 124, 125).

Cohen, Manion and Morrison (2002: 226-228) cited the views of Hopkins (1985: 32); Ebbutt (1985: 156); Elliot (1991: 54) as well as Somekh (1995: 340) who all see action research as a means to bridge the gap between research and practice and even to contribute

to a theory of education and teaching which is accessible to other teachers. This contribution can also lead to making educational practice more reflective and thus enhance the whole teaching-learning situation. This also means that action research can bring about

- changes in the teachers' definitions of professional skills;
- enhancement of competencies of the participants;
- an increase in the awareness of the participants of classroom issues, teaching strategies and assessment practices;
- an improvement in the participants' dispositions toward reflection of their own teaching situation;
- a change in the values and ethics which may improve the congruence between practical theories and practices; and
- a broadening of the views of the participants on teaching.

The discussion by Ebersohn, Eloff and Ferreira (2007: 125-128) confirms this study to be research in which role release is signified. This means that ownership and development are shared between researcher and participants in the research effort. The knowledge interaction taking place in this research is characterised by an interaction between theoretical knowledge (constructivist approach) and practical knowledge (teaching and assessment in practice). In this study, the researcher is not distant from the research process and participants. Interactivity between the researcher and the participants constitutes co-construction and co-ownership of knowledge generated for practical applicability.

### **4.3 SAMPLING**

McMillan and Schumacher (2006: 321) describe the sampling process of populations as dynamic, ad hoc and phasic rather than static or a priori. According to them a purposeful sample size to seek information from a specific group and subgroups in the population will be approximately 40 participants.

The population for this particular study was practicing teachers with an M+3 qualification, with a REQV13-level status who enrolled for the Advanced Certificate in Education (ACE) offered at the University of the Witwatersrand to upgrade their qualification to

reach the REQV14 level. For further clarity, what is meant by the REQV status of a teacher and why the teachers identified as a population need to follow a professional upgrading programme to reach the REQV 14 status, is explained.

Fundamental to the recognition of the qualifications of a teacher is the allocation of a *Relative Education Qualification Value (REQV)* to the qualifications. Loots (2008: 1) explains that the REQV plays an especially important role in determining not only the correct salary level of an educator, but also whether a person may be employed to a particular post, to establish whether a person may be registered with the South African Council for Educators, whether an educator qualifies for a once-off cash bonus on qualification improvement, or whether a particular person is considered to be under-qualified or unqualified for employment in education. An REQV is based on multiples of 120 SAQA credits at specific levels of the National Qualifications Framework (NQF); 120 SAQA credits refer to the equivalent of one-year full-time study. A three-year qualification carries 360 SAQA credits and 480 credits refer to the equivalent of four years' full-time study (Loots 2008: 1).

The allocation of an REQV level is done in terms of the national policy document, *Criteria for the Recognition and Evaluation of Qualifications for Employment in Education* (DoE, 2000a) which is based on the *Norms and Standards for Educators* (DoE, 2000b). The estimated number of teachers at an REQV 13-level is approximately 100 000 teachers, as shown as Category 4 in Table 4.1 below. The findings of the teacher qualifications survey came from research conducted by the HSRC (*DoE (2009) Teacher Qualifications Survey*) for the Department of Education.



**Table 4.1: Per category summary of profile un- and under-qualified teachers**

	<i>Description</i>	<i>Current upgrading qualification</i>	<i>Age/ experience profile</i>	<i>Proportion of total sample of 7380 teachers</i>	<i>Estimated number in country</i>
Category 1	Professionally unqualified teachers at REQV 10	NPDE (full 360 credits)	Mainly young and inexperienced	3.0%	10 000
Category 2	Professionally unqualified but academically qualified REQV 12 - 15	PGCE	Many with considerable experience	6.0%	20 000
Category 3	Professionally under-qualified teachers at REQV 11 and 12	NPDE (last 120 credits)	Most are older with considerable experience	REQV 11 1.3% REQV 12 3.1%	15 000
Category 4	Professionally qualified teachers REQV 13	ACE	Mainly mature teachers well into their careers	26.7%	100 000

Source: DoE (2009) Teacher Qualifications Survey. Draft report prepared by the Human Sciences Research Council (Education, Science and Skills Development Research Programme) for the national DoE, Pretoria (16 March)

Considering the number of teachers involved and the possibility of generalisation of findings as discussed in *paragraph 4.2.1.*, the researcher became aware of the greater possibility for the application of the findings in a new educational context. Further recommendations in this regard will follow in Chapter 6.

The *Advanced Certificate in Education (ACE)* is the current qualification that teachers can use either to upgrade from M+3/REQV 13 to M+4/REQV 14, or to retrain in a new subject/learning area, or to further specialise in a subject/learning area that they are currently teaching. The Advanced Certificate in Education (ACE) offered at the University of the Witwatersrand is a two year-qualification which also serves as a bridging course from diploma level to B.Ed Hons-level. The core purpose of the qualification is

professional upgrading to enhance subject knowledge in the particular specialization. In the educational courses the qualification aims to enhance the understanding of a school as an organization, curriculum development, curriculum interpretation and enactment, classroom management, and to guide the students (teachers) in the course towards an improved understanding of teaching, learning and assessment.

For a study focused specifically on the South African educational context, and with the logistical prerequisite that the investigation's data samples had to come from Gauteng and Mpumalanga, the most appropriate group to include in the investigation, was the 287 teachers from 18 schools in Gauteng and Mpumalanga who were enrolled as students at the University of the Witwatersrand for the *Advanced Certificate in Education (ACE)*. In their second year of the ACE-programme, the course in *Approaches to Learning and Teaching (Course code EDUC2001)* is followed in the second semester (last 6 months) of their second year by the course in *Classroom Assessment (Course code EDUC2002)* as the final module to successfully completing and being able to qualify for the *Advanced Certificate in Education (ACE)* at WITS. The students enrolled for the course, were teaching at schools from deep rural to urban communities and were a representation of working-class and middle-class environments.

During the first contact session for the course in *Approaches to Learning and Teaching (EDUC2001)*, the group of students was informed about the planned study and what stages will be linked to the particular investigation. These students had the opportunity to reflect in focus group discussions on their understanding of instructional design, planning, teaching and assessment during the five months that they were engaged with concepts closely connected to constructivism as an approach in the module on *Approaches to Learning and Teaching (EDUC200)*. After completing the module on *Approaches to Learning and Teaching (EDUC2001)*, the whole group of 287 students reflected in writing on their understanding of teaching, learning and assessment as part of an open group discussion and introduction to the module *Classroom Assessment (EDUC2002)* (see *Appendix C*).

During final contact time with these students, they also verbally reflected on the impact of knowledge gained regarding constructivism on their planning, teaching and assessment

practice. This discussion formed part of a two-hour discussion session during the final scheduled contact time for the *Classroom Assessment (EDUC2002) module*. The students (participants) discussed in small groups their ideas and experiences. A scribe jotted down the discussion points and handed the written notes to the tutor who managed these groups. A representative from each small group gave feedback to the whole group. The four tutors who assisted in this part of the research, also gave a verbal impression regarding the impact of constructivism on the teaching and assessment practice of the students (participants) who were involved in the research project.

As final assessment task to complete the module *Classroom Assessment (EDUC2002)*, the students had to conduct a classroom research project as exam equivalent. The exam equivalent required them to conduct classroom research in order to demonstrate how they can plan, prepare for and conduct formative assessment (*see Appendix G*). They further had to reflect on the process and value of the assessment and how a constructivist approach had an impact on their planning. The project (exam equivalent) for the module *Classroom Assessment (Course code EDUC2002)*, referred to in *Appendix G*, served also as the final stage of the investigation to determine how the knowledge and application of a constructivist approach impacted on instructional design and assessment practices. *Appendix D* contains the permission to involve the students as participants in the investigation and to use the exam equivalent as data in the final stage of the investigation.

The ethical considerations regarding informed consent to involve the students as participants as well as the permission to use the data from the exam equivalent project as final stage in the empirical investigation will follow in *paragraph 4.4* below.

#### **4.4 ETHICAL CONSIDERATIONS**

Research is dynamic and value bound and values will have an impact and should be understood and taken into account when conducting and reporting research. During the communication process, the researcher therefore ensured the stipulation of ethical guidelines such as informed consent, deception, confidentiality and anonymity (McMillan and Schumacher, 2006: 333), especially because the use of qualitative research methods may be personally intrusive.

Fox and Bayat (2007: 148) stress that voluntary participation, informed consent and the privacy of those who are going to be interviewed or observed should be clearly stipulated. It was also necessary to stipulate the obligations with respect to the participants involved in the study. Ethical concerns encountered in educational research in particular, can be extremely complex and subtle and can frequently place researchers in moral predicaments, especially where the researcher is in a close relationship with the participants (Cohen, Manion and Morrison, 2002: 49-50). A description of the role of the researcher-participant, the cost-benefit ratio attached to the research, the process of finding consent as dialogue with the participants and the access to data follow in the next paragraphs.

#### **4.4.1 The role of the researcher-participant observation**

In this study the researcher became part of the research process as participant observer. Nieuwenhuis (2007: 85) states that to take up the role of participant observer is typically found in action research where the researcher works with the participants in the situation to design and develop intervention strategies. In qualitative research, the researcher tends to become immersed in the situation and the phenomenon being studied. It can then be that the researcher becomes a participant in the situation being observed and may even intervene in the dynamics of the situation. McMillan and Schumacher (2007: 13) explain that the researcher therefore has to maintain a critical self-evaluation of the role of the researcher throughout the research process.

By immersing herself in the research setting, the researcher ensured detailed data collection and the consent of the participants at each stage of the study (*see paragraph 4.4.3 in this regard*). From observation to the focus group discussions to the whole group investigation to project and data collection, the role of the researcher and the participants as participants were outlined in verbal and written terms.

#### **4.4.2 The costs/benefits ratio**

Cohen, Manion and Morrison (2002: 50) contend that the cost/benefit ratio expresses the primary ethical dilemma where the social benefit of the research has to be weighed against the cost of involvement for the particular participants. In this study the benefits of the research totally outweighed any risk of involvement, because all the participants involved confirmed that they gained new knowledge and had the opportunity to practice new teaching strategies and assessment practices during the process of investigation. The self-declared empowering benefit experienced by the participants by gaining a new understanding of the triangular relationship between subject-content-outcomes as well as teaching, learning and assessment confirms the researcher's assumption that there is a high benefit/cost ratio in this particular study. The process through which the participants gained new knowledge in Stages 1 and 2 of the investigation will be discussed in more detail in *Chapter 5*.

#### **4.4.3 Informed consent as a dialogue**

From the first informal stage of the research to the last stage, the students (participants) gave their consent in verbal and written form (*Appendices A and C*) to be included as participants in the study. They also gave consent that their ideas in all discussions as well as their project work may serve as data in the investigation.

The study unfolded in different stages, namely from the focus group discussions (Stage 1) up to the final exam equivalent project (Stage 3). At a general meeting during the first contact time with the participants, the intent of the study was explained to the 287 students involved in the courses *Approaches to Learning and Teaching (EDUC2001)* and *Classroom Assessment (EDUC2002)*. Students (participants) were invited to take part in the focus group discussions on a voluntary basis. Of the whole group, 35 students volunteered to be part of the focus group discussions. These students (participants) gathered after the *Approaches to Learning and Teaching (EDUC2001)* contact sessions to engage in the discussions.

The use of open questions (*Appendix C*) to collect data regarding the understanding of the concept of assessment and its relation to teaching and learning followed during the first contact session in the second semester of the Year 2-study. The Open Questions (*Appendix C*) was scheduled to be part of an introductory whole group discussion and introductory session to the module on *Classroom Assessment (EDUC2002)*. The procedure of the investigation was again explained to the students (participants) because consent in research is a process, not a one-off event and may require renegotiation over time. The explanation before the whole group discussion included the anticipated uses of the data, possible benefits of the study and possible harm or discomfort that might affect participants, issues relating to data storage and security and the degree of anonymity and confidentiality which may be afforded to informants and subjects. The students (participants) had to give written consent that the data from the open questions (*Appendix C*) can be used in the second stage of the research. It was also explained to the students (participants) that only those who want their ideas to be included in the study, had to hand in their answers and discussion on the open questions. This action links to what Cohen, Manion and Morrison (2002: 51) describe as “the subject’s right to freedom and self-determination”. Individuals can therefore choose to participate in the investigation after being informed of the facts that were likely to influence their decision. Therefore the freedom to choose whether they want to be included in the study protects and respects their right and self-determination. Altogether 271 students (participants) submitted their discussion sheets to be included in the data collection and further research, which is 94.5% of the whole group.

In addition to the element of “voluntarism” in informed consent, Cohen, Manion and Morrison (2002: 51) refer to competence, full information and comprehension as the other three elements of informed consent. The students (participants) who were involved in the study are according to the researcher the most appropriate group to be involved as participants in this study. As stated in *paragraph 4.3*, these students (participants) were practicing teachers, were enrolled for a professional teacher upgrading course (*Advanced Certificate in Education (ACE)*) which includes new knowledge on constructivism as an approach to learning and teaching (*EDUC2001*) and also had to complete a course in classroom assessment (*EDUC2002*) in the second semester of their second year of study.

To involve these students (participants) in the study over a period of eleven months, provided a full opportunity to the researcher to involve them in focus group discussions as part of a pilot investigation and first stage of the investigation, a whole group discussion as second stage of the research, informal interviews initiated by the students (participants) themselves on the topic of investigation and conducting a project as final stage of the research and data collecting process. During the whole process the participants received complete information about the research and the reason for the investigation. The researcher made sure that the participants fully comprehended not only the reasons for the research, but also to involve them in the detail and characteristics of qualitative research. This lengthy research process also provided the opportunity to build a trusting relationship which McMillan and Schumacher (2006: 334) refer to as the “dialogue” between researcher and participants. In this particular study this dialogue was extended even outside the structured research due to the intense interest of the participants in the research process and topic.

#### **4.4.4 Access and acceptance**

Cohen, Manion and Morrison (2002: 51) claim that access to the institution where the research is to be conducted and permission before embarking on the task is of great significance in the last stage of the investigation. For this study, the researcher consulted Prof Mary Metcalfe as Head of Wits School of Education (WSoE). The researcher discussed the first stages of the research with her, explained the further intent with the study and requested permission to pursue the last stage of the empirical study. Prof Metcalfe expressed her interest in the study and mentioned that the study will also add value to the improvement of various courses in teaching training and development. Prof Metcalfe gave written permission (*see Appendix D*) to access and to use the exam equivalent project files as data in the last stage of the investigation. Her consent as Head of School was essential especially because the exam equivalence project formed 50% of the final promotion mark of the students and is therefore considered as confidential and academic property of the WSoE.

The data collected from the exam equivalent suited the purpose of the final stage of the investigation, namely to collect data on the influence of a constructivist approach on

planning and assessment practices, with special reference to the application of formative feedback in the assessment process. The students (participants) had to conduct a project over a three-month period and had to report on how they planned an assessment process, how formative feedback was part of the process and in what ways the knowledge about a constructivist approach influenced their thinking regarding strategies in the teaching – learning process (*see Appendix G*). A detailed discussion of the research project follows in *paragraph 4.6.3* and the findings of the project will follow in detail in *Chapter 5*.

## **4.5 THE VALUE OF A LITERATURE REVIEW**

The literature review done in *Chapters 2 and 3* reconfirms the importance and value of unpacking key concepts and theory and to find a conceptual framework as explained in *Chapter 1, paragraph 1.6.1*. The relevance of the argument for a constructivist approach in instructional design and assessment practices could be reiterated and the theoretical framework is determined for this particular study.

Furthermore it became evident that the concepts interlinked with the research could be examined through discussing views, evaluating arguments and analysing particular concepts. The review also served as a critical reading of approaches to teaching and learning, instructional design models and the purposes of assessment. The literature review gave the researcher the opportunity to find justification for the research by identifying the “knowledge gap” as described by Badenhorst (2007: 43). In this study the “knowledge gap” refers in particular to what ways a constructivist approach may impact on instructional design and assessment practices. The literature review also assisted in developing criteria for the data analysis and to establish an analytical framework for the interpretation of the collected data.

## **4.6 DATA COLLECTION**

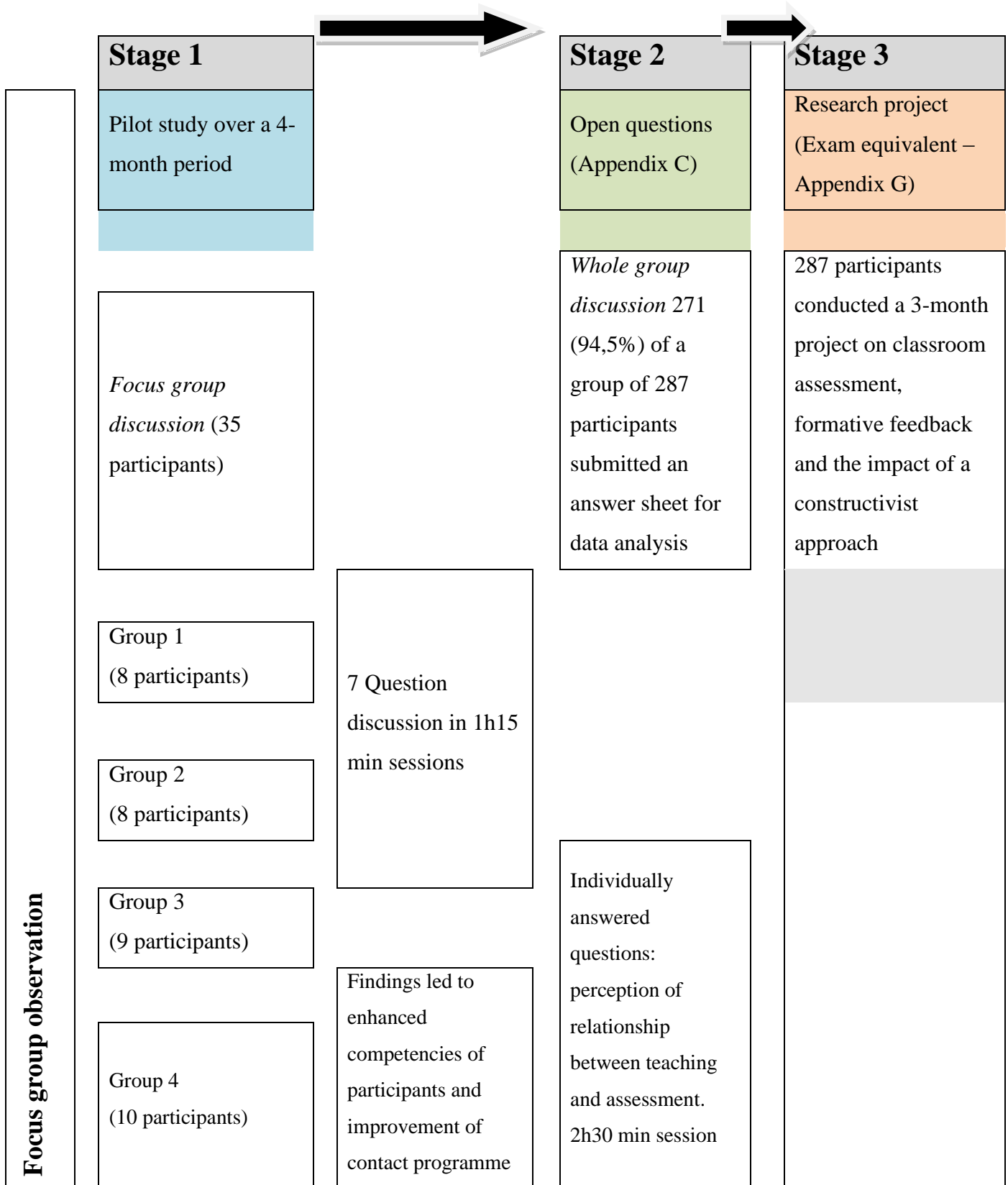
The data was collected over a period of eleven months which included the data from the focus group discussions (Stage 1, *see paragraph 4.6.1*), the open questions (Stage 2 *see paragraph 4.6.2*.) as well as the data from the exam equivalent project (Stage 3, *see paragraph 4.6.3*) conducted over a three-month period. As mentioned in *paragraph 4.3*,



the 287 participants were students from the Wits School of Education (WSoE) following the Advanced Certificate in Education (ACE) programme offered at the University of the Witwatersrand. The data collection process is summarized in *Diagram 4.1* on the next page:

Diagram 4.1: Summary of the research process

## Qualitative research process



#### 4.6.1 Focus group discussions and observation

As mentioned in *Chapter 1, paragraph 1.6.3*, the researcher used focus group discussions as part of a pilot study in Stage 1 of the research. Cohen, Manion and Morrison (2002: 288) state that data emerging from the interaction of these groups gives insight into feelings and experience at large. The researcher's attempt has been to let the group reflect on their experience of instructional design, planning, motivation and their understanding of assessment in general.

For the focus group, the researcher recruited 35 of the students who were enrolled for the professional upgrading ACE- programme at the Wits School of Education (WSoE). These students were practicing FET mathematics and science teachers from different schools in Gauteng and Mpumalanga. The students (participants) are practising teachers at schools which are situated in different socio-economic areas, but all use English as language of instruction. The students enrolled in the Advanced Certificate in Education (ACE) successfully completed Year One of their study, the modules *Curriculum in Context (EDUC1004)* and *Curriculum Development (EDUC1003)*, and had yet to complete the modules *Approaches to Learning and Teaching (EDUC2001)* and *Classroom Assessment (EDUC2002)*, to be awarded the ACE-qualification. The profile described above, depict these students as participants with a particular background and characteristic (Morgan, 1988:44). These students were from the same study group, were all enrolled for the second year of study and had a trust relationship with the researcher, which ensured that they felt comfortable enough to speak their mind in the focus group discussions.

As early as the 1980s, Morgan (1988: 41-48) suggested that a focus group should consist of between 8 and 12 participants to ensure that constructive discussion will take place. For this reason four groups of 8, 8, 9 and 10 participants each discussed the following questions (*see Appendix B*):

- How do you plan and design your teaching?
- Do you make use of a particular theoretical framework in your planning? If so, explain how you would frame you planning theoretically.
- Do you see motivation as important in teaching? Give reasons for your answer.

- Do you think that teaching and assessment should be integrated entities? Give reasons for your opinion.
- What do you think influence your way of teaching and assessment?
- When and for which purposes do you assess?
- Do you feel that you assess effectively? Give reasons for your answer.

The researcher attended the sessions as an observer, but a tutor led the discussion and a scribe made notes of the discussion which the researcher used afterwards while analyzing the data. Nieuwenhuis (2007: 86) refers to this useful strategy to obtain a full record of the discussions as “member checking”. In this investigation the “member checking” was done by the scribe and the tutor who led the discussion sessions to further verify the understanding and interpretation of the researcher who acted as observer in the discussion sessions. Having more than one other person to verify the interpretation, observation and the decoding of data lessens the risk of the researcher becoming to subjectively involved and letting biases cloud the investigation. Being part of the discussion provided the researcher an opportunity to build a good relationship with the participants and for them to be open enough to the researcher to speak their mind.

*A detailed discussion of the findings follows in Chapter 5.*

#### **4.6.2 Open questions (see Appendix C)**

As mentioned in *Chapter 1, paragraph 1.6.2.3*, the open questions were concept-based. These questions and discussion thereof were part of a whole group discussion and introductory lecture on *Classroom Assessment (EDUC2002)*. The *Approaches in Learning and Teaching (EDUC2001)* completed prior to the above-mentioned module included content on constructivism as an approach and the possible teaching strategies linked to constructivist ideas. The following questions were used as open questions (*Appendix C*) in the introductory discussion and lecture:

- What do you understand by the term “assessment”?
- Do you think there is a link between teaching and assessment? Give reasons for your answer.
- When and how do you plan for assessment activities at the moment?

- Do you consider outcomes to be part of assessment criteria? Give reasons for your opinion.
- For what purpose do you use assessment in your classroom?

The group of 287 students (participants) completed the sheet individually and had a peer discussion on the ideas and opinions, which was followed by a whole group discussion session. This discussion was part of the first contact session to deal with assessment in education practice. The students (participants) could use their answers to the questions to participate in the whole group discussion and had the opportunity to make notes of the discussion to feed into the second time slot of the students' (participants') contact and lecture time on the same day. This activity gave the students (participants) the opportunity to compare their understanding and views with that of the rest of the group, while they could use ideas from the discussion to add to their existing level of knowledge and understanding of the link between teaching, learning and assessment.

The individual answers and the whole group discussion proved to be valuable at this stage of the research. First, the researcher could establish whether the ideas found in the focus group discussions were similar to the understanding and perceptions in the bigger group of 287 students (participants), and second, gather data about the students' (participants') understanding and their ideas about the links between instructional design (teaching) and assessment. Even at this stage, the researcher could establish in what manner the students (participants) gained knowledge of how constructivism as an approach to learning and teaching impacted on their ideas regarding the relationship between learning, teaching and assessment. In particular, the researcher wanted to establish whether there were noteworthy differences in the responses of the participants who were involved in the focus group discussions and the other students who were not part of the previous discussions. The researcher therefore separated the discussion sheets of the participants who were involved in the focus group discussions from the rest of the group to compare the views and ideas with those of the rest of the group. A detailed discussion of the findings will follow in *Chapter 5*.

### 4.6.3 Research project (Appendix G)

The students (participants) had to conduct a classroom project in which they had to demonstrate their planning, how they prepared for and conducted formative assessment in a constructive manner, evaluated the work of the learners and gave feedback. They also had to reflect on the process and value of the assessment. The project gave the students (participants) the opportunity to indicate how they approached planning and whether they were competent and reflective assessors in the classroom.

This project served a dual purpose, namely as exam equivalent for the course *Classroom Assessment (EDUC2002)* as well as the last stage in the data collection process of this research study on the impact of a constructivist approach on instructional design and assessment practices.

Prior to the project, the students (participants) did a preliminary investigation of the current state of their teaching and assessment practice. Their notes on their own teaching and assessment practice served as the available information when they had to report on their findings regarding how their knowledge of constructivism impacted on their planning, teaching and especially their assessment.

The students (participants) had to conduct and complete the project over a period of three months. The students (participants) could also use the project as an opportunity to apply new knowledge gained in their teaching and assessment.

The data collection in Stages 1 and 2 of the data collection process provided valuable information which informed the compilation of a contact session programme for *Classroom Assessment (EDUC2002)* which had to follow two months after the first contact session. The researcher also scheduled time in the programme for the students (participants) to give feedback on their progress, ideas regarding changes in their thinking about teaching and assessment, as well as question- and answer time (*see Appendix F*). During this session, the students were involved in small group discussions and whole group discussions on classroom assessment and again shared their feelings and experience about the place of assessment, planning around assessment and the interrelationship with learning and teaching.

After the second contact session, the students (participants) had to finalise the project (*see Appendix G*) and had to submit the project and reports within two months after the final contact time with the researcher. The discussion of the reporting on the project which had to include the following three sections will follow in *Chapter 5, paragraph 5.3.3*:

Section A: Evidence of the planning, preparation and conducting of formative assessment.

Section B: A descriptive report to contextualise the project.

Section C: A reflective, analytical report on findings and an overview of their own experience regarding newly gained knowledge and its impact on learning, teaching and assessment.

At this stage none of the students wanted to exempt themselves as participants and gave consent that the researcher may use their projects as final stage of the research. The projects of all 287 of the students could therefore be included as participants in the last stage of the research.

According to university policy, all exam scripts and exam equivalent projects were required to be archived after the final assessment process and entering of marks approved by the exam board. The scripts or projects had to be kept in a secure area for review in case students appealed in any way against their marks or final performance. The researcher adhered to the policy regulations by submitting the letter of access (*Appendix D*) to the exam officer who saved the letter together with the archived project files. The researcher only gained access to the project files after the period of four months as stipulated in the exam, assessment and mark regulations had lapsed. The exam officer allowed the researcher access to the files, but kept a copy of the letter of access to data (*Appendix D*) as reference for the action.

## **4.7 REFLEXIVITY**

McMillan and Schumacher (2006: 327) define reflexivity as rigorous self-scrutiny by the researcher throughout the entire research process. The researcher's act of posing difficult questions to herself assumes that she cannot be neutral, objective or detached. The researcher is of the opinion that reflexivity is necessary for this particular study, in

particular to establish credibility for the research done. It appears that reflexivity requires an awareness of the researcher's contribution to the construction of meanings throughout the research process, and an acknowledgment of the impossibility of remaining “outside of” one's subject matter while conducting the research.

Pillow (2003, as cited by McMillan and Schumacher (2006: 327) elucidates reflexivity to be a sign of self-awareness, the recognition of others, the researcher's insistence on getting it right or being accurate and as transcendence. Etherington (2004: 31-32) understands researcher reflexivity as the capacity to acknowledge own experiences and context to inform the process and outcomes of the research (inquiry).

Willig (2001: 10) identifies two types of reflexivity, namely personal reflexivity and epistemological reflexivity. According to Willig (2001: 10), “*personal reflexivity*” involves reflecting upon the ways in which our own values, experiences, interests, beliefs, political commitments, wider aims in life and social identities have shaped the research. It also involves thinking about how the research may have affected and possibly changed us as people and as researchers. Interpersonal emotions in research are essential in data collection activities because of the face-to-face interaction. This means that feelings serve several useful functions throughout the research process. This aspect appears to be a core part of validity. There is a need to be candid, meaning that the researcher should not spend too much time attempting to keep her/his own feelings and personal reactions out of the study. If there is relevance in the researcher's feelings to the matter at hand, these feelings should be revealed.

Willig (2001: 10, 11) further spells out that “*epistemological reflexivity*” requires the researcher to engage with questions such as:

- How has the research question defined and limited what can be “found?”
- How has the design of the study and the method of analysis “constructed” the data and the findings? How could the research question have been investigated differently?
- To what extent would this have given rise to a different understanding of the phenomenon under investigation?



Thus, epistemological reflexivity encourages the researcher to reflect upon the assumptions (about the world, about knowledge) made in the course of the research, and it helps him or her think about the implications of such assumptions for the research and its findings.

As explained in *paragraph 4.2.1*, it is clear that qualitative research also depends a lot on the interpersonal skill of the inquirer (researcher) such as building trust, keeping good relations, being nonjudgemental and respecting the norms of the situation. Researchers use personal experience and abilities of engagement also by using contextual knowledge of the particular research environment.

## **4.8 VALIDITY**

A general definition of validity refers to data or information which is well grounded or justifiable, pertinent, relevant, acceptable, related to the current topic, or presented within context. Conclusions drawn from analyzing survey data are only acceptable to the degree to which they can be shown to be valid (Golafshani, 2003: 600-602).

To disregard validity is to put the trustworthiness of the research in doubt and to call into question others' confidence in its results. Even when qualitative measures are used in research there will always be the need to measure. Validity is therefore used to determine whether research indeed measures what it intended to measure and to approximate the rigor, quality and trustworthiness of the results (Seale, 1999: 465; Golafshani, 2003: 600-602). The measuring of "rigor" in qualitative research, according to Davies and Dodd (2002:281), refers to the exploring of subjectivity, reflexivity and the social interaction of interviewing. These ideas link to reflexivity as discussed in *paragraph 4.7*; because if the research is too paradigm-bound, the research can become stagnant.

McMillan and Schumacher (2006: 324) point out that validity ought to reflect a degree of congruence between the explanations of the phenomena and the realities of the world. They are of opinion that validity should question whether the researchers indeed observe and interpret what they think they see or hear. In other words, valid reporting should reflect the mutual meanings of participants and researcher in the interpretations.

Cohen, Manion and Morrison (2002: 105) on the other hand are of opinion that validity should be seen as a matter of degree rather than an absolute state. They concur with Seale, (1999: 467, 468) and Golafshani (2003: 602-615) that in qualitative data the subjectivity of the participants, their opinions, attitudes and perspectives together contribute to a degree of bias. Therefore data validity might be addressed through honesty, depth, richness and scope of data achieved, the way the participants are approached and even the objectivity (or not) of the researcher.

Cohen, Manion and Morrison (2002: 106) convincingly expound naturalistic research principles, namely that research is context bound, data are socially situated and descriptive and the researcher aims to catch meaning and intention; therefore respondent validation is necessary. Although human error is more possible in such an approach, the researcher is part of particular contexts and will therefore report on the representations as reflected by the respondent's views and ideas, rather than trying to reproduce.

The research in this study aims to reflect credibility, theoretical and inferential validity and transferability. A short description of each will follow in the next few sections.

#### **4.8.1 Credibility**

Credibility refers to the objective and subjective components of the believability of a source or message and to a great extent links to the validity of a study. In this regard, Rieh and Danielson (2007: 360) argue that trustworthiness and expertise are the main components to determine the level of credibility. Although trustworthiness (*see paragraph 4.2.1: Qualitative research*) is based more on subjective factors, as explained by Johnson (1997: 281) the choice of questions, the interpretation of data, quality of participation in communication and the researcher's established professional and emotional relationship with the participants and field of study, may all contribute towards a high level of credibility in this study.

Botes (2003: 180) identifies credibility in qualitative research to be the equivalent of internal validity in quantitative studies with particular features such as sufficient involvement, member checking and critical discussion with peer group members.

Sufficient or prolonged involvement adds to the credibility of this research. The researcher was entrenched in the field of study and had prolonged interaction and ten contact times with the participants over a period of two years. The first few contact sessions involved especially contextual influences in the teaching-learning situation and understanding of their own roles. These contact times gave an opportunity to get to know the respondents' culture and values in order to eliminate as many misconceptions as possible. The contact established trust and openness between researcher and participants (respondents), which further enhanced the credibility of the study.

The contact in the second year was focused on the respondents' reactions, understanding, perceptions and application of theoretical frameworks, in this particular case their understanding of constructivism as an approach and its application in instructional design and assessment practice. A detailed discussion of the respondents' reactions in the focus group discussions (*Appendices A and B*), open questions (*Appendix C*) and the research project (*Appendix G*) will follow in *Chapter 5*.

#### **4.8.2 Theoretical validity**

Botes (2003: 177) links theoretical validity to good theoretical definitions. She indicates that to define a concept, the meaning of the concept must be clarified. Moreover, she claims that such a process is known as conceptual analysis and forms part of the conceptualization of the research. In both the focus group discussions (*Appendices A and B*) and open questions (*Appendix C*) it was essential that the participants understood the meaning of the concepts under discussion in order to provide applicable responses. A well-defined conceptual framework for the study also links to and includes a good theoretical base and literature review as discussed in *Chapters 2 and 3*.

#### **4.8.3 Inferential validity**

Inferential validity refers to the degree to which the inferences are consistent with each other and with the known state of knowledge and theory. In other words, it has to do with the logic of arguments in the research. By presenting logical arguments, the researcher justifies the research findings and in this way convinces the research community of the validity of the research (Botes, 2003: 183).

Inferential validity should be part of all steps in the research process. In this case it will imply that the questions used in the focus groups, the open questions and in the project are consistently linked to the concepts used in the study field, integrated with the knowledge of the participants and interlinked with the constructivist approach under research. Inferential validity will also be applicable to the “golden thread” of discussion which in this study aims to find in what ways a constructivist approach will impact on instructional design and assessment practice. This requires the researcher to make acceptable statements on rational grounds and based on the empirical research done in the study. In this study, the researcher aims to back up the empirical research with a well-founded theoretical framework and literature study.

#### **4.8.4 Transferability**

The researcher found that to make an inductive generalization from the responses of the participants (sample) to the wider teacher population, a large representation of the target population should be included in the study. Throughout, the researcher kept in mind the influence of contexts in this study and worked with a particular group of participants, which increases the level of transferability. Furthermore, the researcher acknowledged that transferability requires very good listening skills, good and accurate record keeping and to strike the balance between data perceived to be important and data which is indeed important. The time spend in the focus group discussions required the researcher to listen with a “focused ear” to the respondent’s ideas and their fears about understanding of links in teaching and assessment in order to find recurring ideas and themes to be used in the contact programmes and application of research in action. The researcher therefore has used the data collected in the Focus Group Discussions (*Appendices A and B*) to formulate follow-up questions during the discussion time and to establish what the general trend is regarding the understanding of theoretical framework, practical planning for instruction and the understanding of a link between teaching and assessment.

The findings from the three stages of investigation and the information on the “sampling” in *paragraph 4.3* and the will both be included in *Chapter 5* as further discussion regarding the transferability of the study.

## **4.9 CONCLUSION**

The choice for using qualitative research methods in this particular study is the focal point in *Chapter 4*. The researcher considered ethical considerations to be essential in any research process and therefore provided a detailed discussion of benefits, consent and the importance of access to research data. Data collection is deemed to be the core of the research process, because without any data no research investigation is possible. For this reason the explanation of the data collection process can be viewed as another indication of the validity and transferability of the findings of this research.

## **5. CHAPTER 5: RESULTS OF THE EMPIRICAL STUDY**

### **5.1 INTRODUCTION**

*Chapter 4* outlined the qualitative research design which serves as an indispensable source of practical information on the impact of a constructivist approach on instructional design and assessment practice. As described in *Chapter 4*, the research design was not only structured to complement the literature study, but to allow findings to feed into an action research process and enhance knowledge on learning, planning, teaching and assessment.

In this chapter there will be a summary of the research stages with the core focus on the findings in Stage 3 as final stage of the research process. Major themes (main thoughts) and recurring patterns with regard to instructional design and assessment practice from the literature will be identified. A further intention is to use these themes and patterns to strengthen the evidence in the application of a constructivist approach in instructional design and assessment practice to enhance efficacy holistically in the teaching-learning environment.

### **5.2 REFLECTION ON THE RESEARCH PROCESS**

As mentioned in *Chapter 1, paragraph 1.6.2.1*, and further discussed in *Chapter 4, paragraph 4.2.2* and illustrated in *Diagram 4.1*, action research is deemed most applicable in this study and especially in Stages 1 and 2 of the study. Both the pilot study with *focus group discussions* (Stage 1) and the *open questions* (Stage 2) involved intense participation, were interactive in nature and formed part of knowledge development, which also included the feelings expressed and the meaning and interpretations that the participants associated with the teaching-learning situation. These two stages bridged the gap between research and practice and contributed to the adaptation of the educational programme the participants were involved in. The participants declared their involvement in the study as praxis enhancing, because they gained much more insight into their own teaching environment. This also improved their dispositions toward reflection on their own teaching situation. They verbalized their new understanding about the triangular

relationship between teaching, learning and assessment as an enriching experience. The participants showed an increased awareness of classroom issues, teaching strategies and assessment practices in general and in their subject fields in particular.

Stage 3 of the research was a project which stretched over a three-month period. The participants had the opportunity to practically apply in Stage 3 the information gained from Stages 1 and 2. As mentioned in *Chapter 4, paragraph 4.6.3*, the project (*Appendix G*) served a dual purpose, namely as exam equivalent to constitute the final promotion mark for the module *Classroom Assessment (EDUC2002)*, but also as final stage of the empirical study as approved by the Head of the University of the Witwatersrand School of Education, Prof Mary Metcalfe (*Appendix D*).

The researcher was closely involved in the research process and with the participants at all stages of the study. This resulted in the interactivity between the researcher and participants and constituted co-construction of the knowledge generated for practical applicability. The researcher could use the research data to adapt and improve the educational programme to the advantage of the participants, but also create a larger data pool to use in the research process to broaden and enhance views regarding a constructivist approach to instructional design and assessment practice.

## **5.3 FINDINGS IN THE QUALITATIVE RESEARCH PROCESS**

### **5.3.1 Focus group discussions in Stage 1 of research (Appendices A and B)**

As was mentioned in *Chapter 1, paragraph 1.6.2.2*, and further discussed in *Chapter 4, paragraph 4.6.1*, focus group discussions (*Appendices A and B*) were used as part of a pilot study in Stage 1 of the research. The groups were required to reflect on their experience of instructional design, planning, motivation and their understanding of assessment in general.

As mentioned in *Chapter 4, paragraph 4.6.1*, the focus groups consisted of 35 FET mathematics and science teachers from different schools in Gauteng and Mpumalanga who volunteered to be included as participants in the research. The ACE-students (participants)

had just started with a course in *Approaches to Learning and Teaching (EDUC2001)* which includes content on a constructivist approach, when the researcher approached the whole group of 287 students and explained the aim of the research. The researcher also explained the importance of the confidentiality of the survey and reiterated that the participants may at any stage of the investigation withdraw if they felt uncomfortable in the investigating process. The students were eager to be included as participants and be involved in the survey, but the 35 students who attended the research discussion meeting and who gave their verbal and written consent (*see Appendix A*) to be included in the focus group discussions, were accepted as participants. Four tutors involved in the ACE programme and who were lecturing the module *Approaches to Learning and Teaching (EDUC2001)* agreed to lead the discussions (*see Appendix B*). By doing so the researcher was in the unique position to be an observer and to make notes of the discussions. This provided the researcher the unique opportunity to be part of the group but also to observe and listen to the discussion.

As illustrated in *Diagram 4.1: Summary of the research process*, the four groups included 8, 8, 9 and 10 participants each. The tutor of each group (*see Appendix B*) posed the questions below verbally by using a transparency on an overhead projector. The reason for the use of a transparency was to establish an “openness” in the discussion and to free the participants from a feeling of right or wrong answers or to write down any answer to questions. The scribe in each group made notes of the discussions. The researcher also made observer notes on reactions, answers and even the reaction through body language (paralingual reactions) of the participants.

The following questions as also referred to in *paragraph 4.6.1(see Appendix B)* were posed:

- How do you plan and design your teaching?
- Do you make use of a particular theoretical framework in your planning? If so, explain how you would frame you planning theoretically.
- Do you see motivation as important in teaching? Give reasons for your answer.
- Do you think that teaching and assessment should be integrated entities? Give reasons for your opinion.
- What do you think influence your way of teaching and assessment?



- When and for which purposes do you assess?
- Do you feel that you assess effectively? Give reasons for your answer.

The participants spent more than an hour in the discussion sessions and indicated later that it was a pity to halt the discussion because they could voice their experiences, feelings and even fears regarding teaching, learning and assessment and share the ideas with fellow teachers. Some of the tutors reported that the discussions continued later during sessions, after contact sessions and even during lunch break which was an indication that these participants became intrigued by their understanding of the relationship between planning, teaching and assessment.

### **5.3.1.1 Findings of Focus Group 1 discussion**

Most of the participants in Group 1 mentioned that they mostly plan their teaching according to the content which ought to be taught. Some of the participants in this group stated that they do not think about a design or framework according to which they can plan, but just make sure that they cover the amount of work in the allocated teaching time.

This group mostly consisted of participants with a mathematical background and was of opinion that drill and repetition give the best results. Nearly all of the participants in this group were Grades 11 and 12 teachers and are very concerned about the performance of their learners.

Motivation is according to this group very important in the teaching and learning situation, because a de-motivated learner in the class will not attempt to improve. Two participants in the group acknowledged that they struggle to motivate the learners in their classes. The learners are mostly from a lower socio-economic stratum and go home during break to prepare lunch for the siblings. Sometimes the learners will not return to school and for that reason they as teachers do not plan any kind of assessment after break, but rather plan assessment tasks for the mid-morning periods to ensure that most of the learners will be in class and attempt these tasks.

Most of the participants indicated that they realise only after starting the ACE-courses that there ought to be a close relationship between teaching and assessment. The participants in this group feel that the content, the level of the learners and the time available influences what kind of assessment they will use.

Only one respondent in the group mentioned that he uses assessment to diagnose the level of understanding of the learners. All the others admitted that assessment should give a mark and especially because learners have to complete portfolios, they work according to the requirements in the subject assessment guidelines and the requirements of the portfolios. The participants indicated that they use assessment mostly for the purpose of grading because, due to contextual constraints, they have to rush through the curriculum in an attempt to cover most of the content.

The participants in this group expressed the wish to be able to apply assessment effectively, but they don't know how to plan to do so.

#### **5.3.1.2 Findings of Focus Group 2 discussion**

Five of the participants from this group came from the same district with a subject advisor who gives good guidance and who believes in collaboration to enhance the teaching-learning situation. The other three participants expressed their envy of the collaboration and the clear motivation amongst the colleagues because they cannot speak "that same tongue". The three participants previously referred to, requested the other participants in the group with positive experiences to share with them their good experiences in order for them to learn more about the possibilities of collaboration.

The researcher requested these three participants to also mention their experiences and to have the courage to speak openly, especially because they are involved in an upgrading course in teaching development. These participants voiced their concern about the focus of their subject advisor on administrative issues and whether the learners answered all questions, rather than the quality of answers or whether there is evidence of real understanding. They felt anxious about the mounts of paper work which prevent them from preparing properly. The participants admitted that they do assessment haphazardly

and do not use the performance of learners as an opportunity to plan a follow-up lesson. These three participants explain that the fear not to have the required administrative tasks completed and ready influence the way they plan for teaching and assessment. They mentioned that assessment is a tool to establish a mark and to be able to complete the forms and submit portfolios in time. The three participants admitted that they do not assess effectively because they evaluate and grade and do not use assessment at all to find the aspects learners may struggle with.

The five participants, who mentioned that they feel motivated to teach, will teach even though the circumstances are difficult. They also mentioned that many of the learners are from families who are not that privileged, although the learners will still attend class and will seek guidance from the teacher in an attempt to improve. There appeared to be a clear link between teacher motivation and learner performance in the explanations and experiences of these five participants. The influence of feelings and perspectives about teaching and assessment became evident. The five participants also mentioned that sometimes when they were feeling anxious about the submission of portfolios and reporting on learners' work, they do not plan in detail, but just make sure what to teach. At these stages they rely on preparation done previously, or just on experience to continue with the next day's teaching. The participants were honest about the lack of proper preparation during such times.

### **5.3.1.3 Findings of Focus Group 3 discussion**

The participants in Group 3 were mostly of the opinion that planning for teaching is still structured in the traditional manner in which the content determines how to teach. The participants mentioned that some learners will resist attempts to change accustomed routines, for any such change is threatening, and emphasis on the challenge to "think for themselves" (and not just work harder) can be disturbing to many. For these reasons it is easier and more convenient to follow "the old ways".

A concern from Group 3 was that they might not know enough about the level of understanding of their learners to be able to assist them with their particular problems. On the other hand the participants themselves were concerned that they might lack subject

knowledge and don't want to be confronted in class with questions that they as teachers cannot answer. The participants in Group 3 claimed that it is not to leave their own "comfort zone" that they prepare lessons in lecture form and transmit the knowledge that they are familiar with.

The participants in Group 3 also reported that many of the initiatives to change the perspective on teaching and learning and the working methods of learners are time-consuming, and though they already struggle to cover all curriculum content they don't want to take risks in applying methods which will not yield rewards of improved understanding in the future. Some of the participants said that they don't think all their learners have the ability to do well in the subject, but they only took the subject because it is compulsory and that the subject may "open doors" for them. Most of the participants were of view that some learners will do much better, if their "situation" can improve. The reference to contextual influences on performance came up in the responses to nearly all the questions. The nods and body language expressed by the participants in the group affirms the matter regarding contextual influences as crucial.

Two issues appeared to underlie the difficulties and experiences the participants in Group 3 expressed. The one is *the view of (beliefs about) learning* and the second *about learners' ability or potential to learn*.

Regarding the view of how learners learn, some of the participants held the assumption that knowledge is to be transmitted and learnt, that understanding will develop later, and that clarity of exposition accompanied by rewards for patient reception are the essentials of good teaching. Regarding *learners' ability or potential to learn*, the double-sided view of potential was very evident in the discussion in Group 3. On the one hand there is the "fixed IQ" view — a belief that each learner has a fixed, inherited, intelligence, so that little can be done apart from accepting that some can learn quickly and others can hardly learn at all. On the other hand, there is the "un-tapped potential" view, prevalent in other cultures, which starts from the assumption that so-called "ability" is a complex of skills that can be learnt. Here, the underlying belief is that all learners can learn more effectively if one can clear away the obstacles set up by previous difficulties. In this instance the

group was of the opinion that socio-economic aspects, illiterate or uninvolved parents and values and moral issues should be straightened up to ensure that learning takes place.

Regarding the question on motivation, one participant in Group 3 reported on a particular situation where extrinsic motivation had a positive intrinsic reaction. The participant explained that his teaching load for 2008 included mathematics for Grade 11. The Grade 11 Mathematics class had a few learners with a history of low performance – so he prepared himself for new challenges. The participant explained further that at the beginning of a year he usually tried to acquaint himself with the learners, their names and their backgrounds. Three months into the year he realized that two of the learners who came with a history of low performance and bad behaviour, improved between 15% and 22% on tasks and assessment in Mathematics. He called them to congratulate them and heard from them that because he knew their names and valued them as individuals they felt more encouraged to take up challenges and suddenly their attempts were rewarded by improved performance. The participant mentioned that these two learners' responses and the respectful tones in which they spoke to him, strengthened his inner motivation a great deal. This participant's view that "*it felt so good to hear that even calling a person by name, can make such a difference*", deserves to be mentioned.

#### **5.3.1.4 Findings of Focus Group 4 discussion**

The participants in Group 4 are of the opinion that assessment should be a part of teaching, but they experience difficulties to incorporate assessment as a part of teaching. The participants indicated that this group discussion on teaching and assessment is a new experience to them because at school questions and other methods used are not discussed with or shared between the colleagues because some feel that they are then critically reviewed on their work.

Three of the participants said that they assess only to award marks and update learner records but they learned from the ACE-programme that their teaching is in fact encouraging rote learning. The discussion revealed that there is a tendency to emphasise quantity and presentation of work and to neglect its quality in relation to learning. Another

crucial issue was that giving marks and the grading functions are over-emphasised, while the giving of useful advice and the learning function are under-emphasised.

Another participant was concerned about learners' marks that "*stayed the same*", although she assessed them frequently on the same content. She mentioned that she does not have any advice to the learners on how to improve. This participant was totally unaware of the possibility that marking and over-assessing may reinforce under-achievement. Her mentioning the attempts to be even more lenient as an attempt to help the learners drew the attention to another issue: that being too generous may bring about under-expectation because the learner may hold the perception that the teacher will "*give marks*".

Most of the participants in this group agreed that learner performance, good management from the principal's office and incentives, especially financial acknowledgement of work well done, are good motivators.

### **5.3.2 Reflection on the whole group discussion of open questions (Appendix C)**

As mentioned in *Chapter 1, paragraph 1.6.2.3* and discussed in *Chapter 4, paragraph 4.6.2*, the open questions were conceptual of nature. In Stage 2 of the research, the ACE-students who were included as participants in the study, completed the module on *Approaches to Learning and Teaching (EDUC2001)* and commenced with a new module in the ACE-programme namely *Classroom Assessment (EDUC2002)*. The module on *Approaches to Learning and Teaching (EDUC2001)* includes content on constructivism as an approach and the possible teaching strategies linked to constructivist ideas.

As further discussed in *Chapter 4, paragraph 4.6.2*, the open questions (*Appendix C*) were part of the general introductory lecture and whole group discussion session during the first contact to deal with assessment in education which includes classroom assessment practice in particular (*see Appendix F*). This first introductory session (*Appendix F*) to the module on *Classroom Assessment (EDUC2002)* also provided the opportunity to bridge ideas and perspectives regarding learning and teaching as discussed in the *Approaches to Learning and Teaching (EDUC2001)* module, and relation to effective assessment in a conducive environment.

The individually completed open questions worksheet (*Appendix C*) encouraged open and honest discussion during the session. The participants had the chance to review ideas and to reflect on the knowledge gained from the previous contact time and module. The participants involved in the focus group discussions (*Appendices A and B*) were incorporated as individuals into the bigger group and could therefore not influence any decisions or final ideas on a major scale.

The individual answers and the whole group discussion proved to be extremely valuable in this stage of the research. First the researcher could establish whether the ideas found in the focus group discussions (*Appendices A and B*) were similar to the understanding and perceptions in the bigger group of 287 students. Second the researcher could gather data about the students' (participants') understanding and their ideas about the links between instructional design (planning for teaching) and assessment.

**Table 5.1: Core findings in discussion of open questions (Appendix C)**

Open Questions	Frequent Answers	Main difficulties experience in practice
What do you understand when we are talking about the term “assessment”?	A “yardstick” /tool to determine teacher and learner progress Collection of evidence Measure learner performance against standards Find out whether objectives are reached An “inspection”	Idea of assessment for recordkeeping Learner involvement in classroom assessment To use as guidance during teaching in class time
Do you think there is a link between teaching and assessment? Give reasons for you answer.	Yes, to measure whether learning took place; whether teaching was effective Yes, purpose of teaching is to have certain objectives met Yes, teaching without assessment is not possible Questions is the link – using question during teaching and again in assessment Problems in assessment to be used to plan for teaching; should be displayed in outcomes	Difficulty to use assessment to plan To assess learners during teaching time Monitoring progress
When and how do you plan for assessment activities at the moment?	Start off with assessment (base-line) At end of lessons, chapters or term Assess through questioning Before (use prior knowledge) during and after lesson Assessment at the end of the lesson, but learn to know that assessment should include what and how	Effective questioning How to improve on assessment activities To link skills with outcomes and assessment standards

Do you consider outcomes to be part of assessment criteria? Give reasons for your opinion.	Learned from programme that there should be a link Outcome what is expected – assessment criteria indicates level of achievement reached	To rewrite outcomes as assessment criteria To plan a lesson from the learning outcome; to link assessment activities with the outcomes
For what purpose do you use assessment in your classroom?	To direct learners Identify learners with problems As encouragement and to help learners to learn To improve teaching strategies Grading and promotion To ensure that learners met expectations Individual and group assessment	To give feedback to parents To use the information to change teaching plans; To find the real barrier to understanding ; “Holistic” assessment Criteria for group assessment difficult to apply

The answers did not mention the differences in cognitive demand and the expectations to be linked to the content, but the participants claimed during the follow-up discussion that they experienced difficulties to link questions to the different cognitive demand levels. The participants indicated that there is a tendency to rely on knowledge questions and basic comprehension questions which only assess basic conceptual knowledge. The result of this tendency in questioning is that coming to summative assessment, learners will not be able to make judgements, restructure and reorganise concepts or be able to interpret and apply knowledge in new contexts.

The participants also said that they focus in their teaching on the content which ought to be mastered and attempt to link some skills (abilities) to these, but find it a big challenge to use outcomes to decide on a teaching strategy.

### 5.3.3 Reflection on the research project (Appendix G)

The research project served a dual purpose, namely as exam equivalent for the *Classroom Assessment (EDUC2002)* module and as final stage in the empirical research for this study. As referred to in *Chapter 4, paragraph 4.6.3*, the students (participants) had to conduct a classroom research project (*see Appendix G*) in which they had to demonstrate how they plan, prepare for and conduct formative assessment in a constructive way. Furthermore, they had to evaluate the learners’ work and give feedback, where after they had to reflect on the process and value of the assessment.



The students (participants) had to include three sections in their reflection and evaluation of the project, namely –

*Section A* in which the respondent had to demonstrate the planning, preparation and conducting of *formative assessment* work in his or her classroom, by following the steps as described below.

*Step 1: Plan for the assessment*

The participants had to plan the assessment process: when the assessment will take place, how long learners can spend on it and how the classroom will be organised. The participants also had to choose a formative assessment task that is appropriate for their learners and had to generate a new task, or use one of the three assessment tasks that they generated for assignment 2 in the *Classroom Assessment (EDUC2002)* module, improve the content of such assessment task in accordance with the feedback they received from the tutor and also apply the further knowledge regarding assessment tasks gained from their engagement with the coursework in Unit 3 of the *Classroom Assessment (EDUC2002)* course materials.

Regarding the planning of the assessment, the participants received guidance on the requirements for the formative assessment task as linked to the assessment criteria as indicated in *Appendix G*. The participants had to ensure that -

- the task has clear outcomes;
- the task has to fit into the learning programme;
- the task should be appropriate for the particular context and the needs of the learners; making sure the assessment context is not biased against any group of learners; and
- a mark memo (assessment criteria/rubrics) that clearly shows what type of evidence (competencies/knowledge/skills) are required accompanies the task.

*Step 2: Prepare the learners for the assessment*

The participants had to apply the information gained during the discussion sessions about fair assessment practices in this step. They therefore had to write down evidence on the manner in which they prepared their learners for the assessment. This involves being

transparent: telling learners about the assessment in good time and making sure the learners understand the assessment criteria. It also involves having a clear learning programme into which the formative assessment task fits, and teaching whatever is necessary prior to the assessment.

*Step 3: Conduct the assessment*

As part of conducting the assessment, the participants had also to take note of the classroom conditions, the timing and the learners' responses which may include emotional reactions to the assessment task and process. After conducting the assessment, the participants had to collect the completed assessment tasks from their learners for marking and feedback purposes.

*Step 4: Evaluate the evidence and make assessment judgements*

The participants had also to provide evidence of their marking of the learners' completed assessment tasks and that they marked the tasks in relation to the assessment criteria and/or mark memo. This step in conducting the project was needed for the researcher to get a sense of the participants' understanding of the link between outcomes, teaching and assessment criteria. This step provided the opportunity for participants to elucidate how they applied the set criteria in the assessment process, but furthermore also to gather information about each learner's response in order to prepare feedback in connection with the answers and in line with the set requirements in the assessment criteria. Reflection on own planning and the learners' responses is part of this step because the participants had to select the work of three learners that they had to present an example of a learner who is not yet competent, one whose work shows evidence of competency and one whose work can be valued as highly competent.

*Step 5: Provide feedback*

The participants had to write feedback on the work of the three learners who represent a learner who is not yet competent, one whose work shows evidence of competency and one whose work can be valued as highly competent. The researcher wanted to find evidence in this step whether the participants could practise the provision of formative feedback as useful, appropriate, related to the criteria and constructive. The participants were also prompted to think about what oral feedback they might want to give the individual learners

or the whole class, or what they might want to say to parents or the principal about the learners' work.

In order to find how the learners experienced the assessment process, the participants were requested to ask the same three learners to write a comment on the assessment task, what their experience was when they did it and what they want to say about the feedback they received.

In *Section B* of the report the participants had to provide a descriptive overview in which they had to describe the context, how they planned, and how the learners responded. The description had to include an explanation of their planning of the assessment as done in Section A as well as the details of the process of implementing formative assessment. Be aware that we who are reading this description were not there. The reference to context had for instance to include aspects such as grade and size of your class, the diversity of learners, the learning programme, the timing of the assessment task in relation to the learning programme and how the learners reacted during the assessment.

The participants' descriptive report had to include evidence of -

- the formative assessment task, the assessment criteria and/or mark memo and any instructions that learners received;
- copies of the three learners' work – one highly competent, one competent, one not yet competent; and
- written feedback on the learners' work, or an account of the oral feedback the teacher (participant) gave. The participants also had to include the learners' feedback about the assessment task.

The participants had to reflect on the whole process which they followed to conduct the classroom assessment project. Accordingly, in the *reflective report* the participants had to reflect on each of the steps, justifying what they did, analysing the learners' responses and evaluating the quality and efficacy of the process they followed in relation to the knowledge they gained from the course materials in both modules: *Approaches to Teaching and Learning (EDUC2001)* and *Classroom Assessment (EDUC2002)*.

In order to review the assessment they did, the participants had to write a report of about six to seven pages, reflecting on the process of planning and implementing the formative assessment, as well as reviewing how they could improve the assessment process in future.

The participants had to explain their thinking at each step, and had to justify the choices regarding an assessment task in ensuring that the assessment task and process were fair, valid and reliable in preparing the learners for the assessment.

The researcher also looked for evidence of -

- the application of a constructivist approach in planning and designing assessment tasks (*Appendix G, Outcome 2*);
- whether the participants adopted formative assessment practices (*Appendix G, Outcome 3*);and
- reporting and reflection on assessment practice (*Appendix G, Outcome 4 and 5*) which may assist in the adaptation and improvement of their planning (instructional design) and assessment practice.

### **5.3.3.1 Findings regarding the assessment practice**

The researcher found a relation between the participants' understanding of the concept of "assessment", the ability to design an assessment task and the application of constructivist views regarding formative assessment. The criteria set for *Outcome 2* (see *Table 5.2*) in the exam equivalent as research project (*Appendix G*) referred to the ability of the participant to design an assessment task which is not only based on concepts, recall of facts, reciting of ideas or definitions. The participants who were awarded Level 3 or 4 (see *columns in green below*) designed tasks which included cognitive demands of comprehension (understanding), application, analysis and even evaluation and synthesis (*Also see Chapter 3, paragraph 3.3.2; 3.5.3; Figure 3.2*). These participants showed understanding of differences in cognitive demand and were able to link a variety of demands to subject content and its application in everyday life. These assessment tasks required more than evidence of conceptual knowledge only – which is in line with the Vygotskian (*Chapter 2, paragraph 2.5.2*) view of planning assessment tasks which require possibilities of improved knowledge and skills.

**Table 5.2: Outcome 2 – Able to design a formative assessment task that is appropriately linked to a learning programme**

**Total marks: 10**

Level 1	Level 2	Level 3	Level 4
0 – 4 marks	5 – 6 marks	7 marks	8 - 10 marks
<ul style="list-style-type: none"> <li>- It is not a formative assessment task.</li> <li>- It is not outcomes based, nor does it assess higher order skills.</li> <li>- Instructions are not clear and/or inappropriate for learners</li> <li>- The task is not related to the outcomes or learning programme</li> <li>- The assessment criteria are not suitable to the task, and/or not related to learning programme / outcomes.</li> <li>- There is no indication that course materials were consulted in the generation of the task and assessment criteria.</li> </ul>	<ul style="list-style-type: none"> <li>- The task is used formatively</li> <li>-The task assesses higher order skills</li> <li>- The outcomes, task, assessment criteria and learning programme relate to each other, even if the relationship is slightly confused</li> <li>- Instructions are understandable at the level of the learners</li> <li>- The language of the assessment criteria or mark memo makes sense in relation to the level of the learners.</li> <li>- Task shows evidence of following principles set out in course.</li> </ul>	<ul style="list-style-type: none"> <li>- The formative task addresses a range of higher order skills, worthwhile knowledge and incorporates values.</li> <li>- It is totally appropriate for outcomes and learning programme</li> <li>- Instructions are obvious and clear</li> <li>- The assessment criteria give both learners and teacher clear guidelines for marks and feedback and help to make the assessment process transparent.</li> <li>- Good use is made of principles set out in course.</li> </ul>	<p>In addition:</p> <ul style="list-style-type: none"> <li>- The task is creative and innovative, with accessible layout</li> <li>- The task is well implemented</li> <li>- It assesses a broad range of skills, giving learners with different abilities a fair chance.</li> </ul>

The participants’ reports showed clear evidence of the relation between having a comprehension of differences in demand and being able to ask questions requiring skills and abilities as demonstration of the level of demand.

### **5.3.3.2 Findings regarding formative feedback**

Many of the participants reported that improved formative assessment supported the learners who experienced difficulties and didn’t perform well in the past. The participant also reported that the more formative feedback these learners received, the more improvement was evident. This confirms the assumption that frequent assessment feedback helps both performers and under-performers to enhance their learning.

That the under-performers benefitted from the feedback appeared to be significant especially as under-attainment usually leads to disruptive behaviour or the likelihood that they will leave school without adequate qualifications. Such learners are likely to be alienated from society as well and to become the sources and the victims of serious social problems. Most often, as the *focus group discussions* (paragraphs 5.3.1.1 – 5.3.1.4) revealed, learners who encounter difficulties and poor results are led to believe that they lack ability, and this belief leads them to attribute their difficulties to a defect in themselves about which they cannot do a great deal. So they will rather avoid investing effort in learning which could only lead to disappointment, and try to build up their self-esteem in other ways. Whilst the high-achievers can do well in such a culture, the overall result is to increase the frequency and the extent of under-achievement.

The positive aspect is that such outcomes are not inevitable. What is needed is a culture of success, backed by a belief that all can achieve. Formative assessment can be a powerful method here if it is communicated in the right way. Whilst it can help all learners, it gives particularly good results with under-performers, where it concentrates on specific problems with their work, and gives them both a clear understanding of what are not yet mastered and which achievable targets they still can aim for. Learners can accept and work with such messages, provided that they are not clouded by overtones about ability, competition and comparison with others.

Figure 5.1: Teacher's feedback on assessment task

Date: 23 September 2008  
Topic: Statistics  
formative Assessment Task

'not competent' +

1.1 side by side graphs. ✓ (1)  
1.2 higher in  $Q_1$  and  $Q_2$  than in  $Q_3$  and  $Q_4$  and was the highest the whole year. It was high because people did not want to be in the health sector. ✗ ✓ (3)  
1.3 Health posts decreased <sup>eg</sup> and education at first and increased later. SAPS posts decreased and education was higher. ✓ (2)  
1.4 In education and in health there is no money like in other Companies. ✓ (2)  
1.5 A lot of people go in the SAPS and were money like in other Companies. here you mixed ideas  
1.6 People run away from SAPS to big companies that's why a drastic fall mixed ideas again because when they run away the posts rise they do not fall.  
1.7  
1.8 If I was a managing director of DMA I will give more <sup>(3)</sup> money to people so that they do not run away and I will give them cars to pay on credit (credit) a very good idea of giving them cars so that they stay on the job to pay for the cars.  
1.9 I will like to be a social worker if I join SAPS.  
2.0 Poygons you did not tell us how it will help to reduce the rise of posts.

## 2.2 five-number summary

Data: 11 14 16 17 18 19 21 22 24 24 ✓ (3)  
 $Q_1 = 15$   $m = 18,5$   $Q_3 = 23$   
 you remembered well

median = 18,5 ✓  
 $Q_1 = 15$  ✓  
 $Q_3 = 23$  ✓ (5)  
 min = 11 ✓ good  
 max = 24 ✓

### averages

median =  $\frac{18+19}{2} = 18,5$  ✓  
 $Q_1$  lower quartile =  $\frac{14+16}{2} = 15$  ✓  
 $Q_3$  Upper quartile =  $\frac{22+24}{2} = 23$  ✓  
 Range =  $24 - 11 = 13$  ✓

### stem and leaf

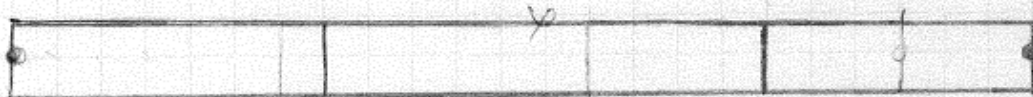
1	2 1 0
4	2 2
6	2 4
7	2 4
8	
9	

Interquartile range  $Q_3 - Q_1$  good work  
 $23 - 15 = 8$  ✓ (5)

### Semi-interquartile range

for both stem and leaf and box & whiskers go back in our textbook and revise on them  
 $\frac{Q_3 - Q_1}{2} = \frac{8}{2} = 4$  ✓

### box and whiskers



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 22 23 24

You greatly improved because you studied hard this is good improvement work much harder to improve more next time. Take your time to revise the work done related to the task to be done so that you remember all.

The feedback to the learner above in *Figure 5.1* related to the particular qualities of his or her work, with advice on what he or she can do to improve. The feedback is linked to specific activities as required in the assessment criteria.



### 5.3.3.3 Findings regarding reflection and feedback by learners

The request in the exam equivalent/research project (*Appendix G*) that learners have to reflect and give feedback on their experience in and of the assessment, reminds one of the Vygotskian views regarding expressions, mediation and the importance of language (*see Chapter 2, paragraph 2.5*). The emphasis was on the learner as an active "*maker of meanings*" and for the teacher to enter into a *dialogue* with the learner, in an attempt to understand the meaning that the learners attached to the material they have learned and were assessed on, and to help them then to refine the understanding until it corresponds with the understanding held by the teacher as more knowledgeable one in this particular situation.

However, there is a further dimension of application, namely that the learner developed a self- and peer-assessment capability, which is inevitably part of a formative assessment practice. The main problem with learners who lack the ability to apply self- assessment or to attach value to activities completed, appears to be not the problem of reliability and trustworthiness, but rather a lack of understanding of the worth (value) of work in relation to set criteria. Learners can only assess themselves when they have a sufficiently clear picture of the targets that their learning is meant to attain. Surprisingly, many learners seem not to have clarity on expectations and appear to have become accustomed to receiving classroom teaching as an arbitrary sequence of exercises with no overarching rationale. It requires hard and sustained work to overcome this pattern of passive reception. When learners do acquire such ability to reflect and attach value, they become more committed and more effective as learners: their own assessments become an object of discussion with their teachers and with one another, and this promotes even further the idea that reflection is essential to good learning.

**Figure 5.2: Learner feedback on English task**

Reflection on English  
Assessment Task.

The CPF (Community Police Forum) came to our school to warn us about the dangers of drugs. They were doing an awareness campaign. Our teacher Mrs Mthembu told us that people use drugs because they are stressful, peer pressure and to ~~entain~~ entertain themselves. Now we know what the word CPF stands for. She gave us the paper of Mmaditaba she read for us. She explain while she was reading. Mrs Mthembu gave us work it was about Mmaditaba. It wasn't difficult I even got good marks. On the essay I wrote about the job I like. I made mistakes but they we not too much and she corrects me on my spelling. It is nice to have a teacher like her.

Learners had the opportunity to reflect on the task, the teaching done, the reaction of the teacher in the class, their experience of the assessment process and the assessment task. The learner's feedback in *Figure 5.2* above also referred to the value of application found in the assessment task – an aspect which many learners stated was important for them. The learner expressed in the last sentence also the emotion towards the teacher – an aspect which also appeared in *paragraph 5.3.1.3* as reflection from the participants in the focus group discussion.

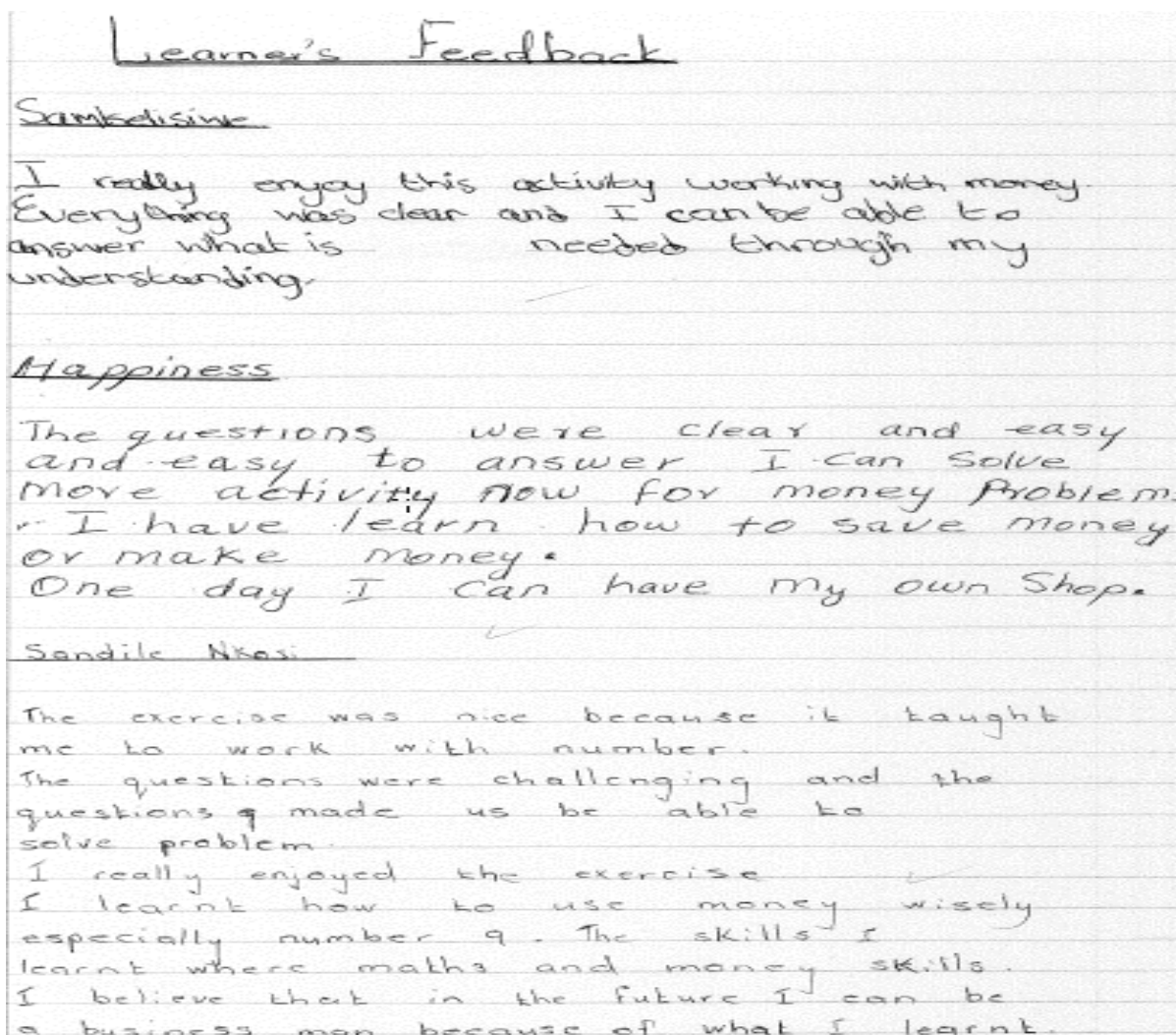
**Figure 5.3: Learner feedback on Mathematics task**

My feedback to the teacher about the task.

The task was not difficult because the teacher prepared us for the task. He told us that we are going to write a task and what to expect. I got one solid wrong. I counted the front faces forgetting about the other and I said is a pentagonal prism. I am able to identify all the solid because my teacher explained to me when he give me my task.

As mentioned in *Chapter 3, paragraph 3.3.2*, learners have to be able to question their own understanding and compare their version of the truth with that of the teacher and fellow learners in order to arrive at a new level of understanding (Henson, 2004: 15). The ability to assess own work and to give feedback on the experiences of an assessment task and process, seems to create a dynamic interaction between task, teacher and learner. Such an ability not only develops an awareness of each other's understanding but also reveals misconceptions. In this regard Scardamalia and Bereiter (2003: 5) argue persuasively that the task-learner-teacher interaction is a process to knowledge-building and encompasses foundational learning and socio-cognitive dynamics. In particular, the interaction involves making a collective inquiry into a specific topic, and may therefore lead to deeper understanding. It is clear that realising and identifying new goals are essential parts of the learning process.

**Figure 5.4: Feedback from learners on money activity**



What this amounts to is that self-assessment by learners is an essential component of formative assessment. What is evident from the examples above is that the learners want to learn – therefore the feedback on their efforts show in some instances a desired goal that they want to achieve, there is evidence about their present position, and some understanding that more is required of them than their current level of understanding.

Significantly, some learners realized that there is still a gap between their current understanding and what is actually required from them as mentioned in the learner's feedback in *Figure 5.3* regarding the experiences in the Mathematics task (*see also Chapter 2, paragraph 2.5.2 and Chapter 3, paragraphs 3.3.2; 3.4.1 and 3.5.2*).

#### **5.3.3.4 Findings regarding reflection and feedback by teachers**

Outcome 5 (*see Table 5.3 below*) of the assessment criteria for the research project (exam equivalent) required evidence of reflection on the teaching, learning and assessment process. The levels indicated in this particular outcome were used to determine whether the participants understood the notion of “reflection” in teaching and especially whether the ability to reflect had an impact on the teaching, learning and assessment process. The depth of reflecting is related to the levels of performance. Basic reflection is linked to 50-58% application, analytic reflection is linked to 60-80% application and insightful, innovative reflection is linked to 85-100% application. The research showed that there is a link between a lack of reflection on the teaching, learning and assessment process and the inability to compile a good assessment task. An inability to reflect also impacts on assessment practices and the identification of strengths or weaknesses in the teaching-learning-assessment process.

**Table 5.3: Outcome 5 - Reflective report: Able to review, reflect on and evaluate the assessment process**

**Total marks: 30**

Level 1	Level 2	Level 3	Level 4
1 - 14 marks	15 -17 marks	18 - 24 marks	25 – 30 marks
<ul style="list-style-type: none"> <li>- Repeats description but no reflection and analysis.</li> <li>- Confused understanding of course concepts such as fairness, characteristics of good assessment tasks, formative assessment</li> <li>- Not able to review strengths and weaknesses of task or assessment process</li> <li>- Cannot suggest improvements</li> </ul>	<ul style="list-style-type: none"> <li>- Basic reflection on and analysis of task and assessment process</li> <li>- Correct understanding of course concepts, especially formative assessment</li> <li>- Able to outline some strengths and weaknesses of the task and process in relation to its context</li> <li>- The task and process are described with reference to the course concepts</li> <li>- Ideas in the different sections of the report relate to each other in some way</li> </ul>	<ul style="list-style-type: none"> <li>- Depth of reflection in review and analysis of task and process</li> <li>- Comprehensive understanding of course concepts</li> <li>- Review is done with appropriate reference to course concepts, particularly from Black</li> <li>- Integrates concepts with the analysis, reflecting an understanding of the relationship between theory and practice</li> <li>- Analytical and evaluative comments are backed up with evidence</li> </ul>	<p>In addition to level 3:</p> <ul style="list-style-type: none"> <li>- Presents valuable insights into assessment tasks and processes</li> <li>- Has used course readings to generate good assessment practice</li> <li>- Has excellent insight in formative assessment conducted constructively</li> </ul>

The participants who performed well (*see Table 5.3, Levels 3 and 4*) mentioned that they gained from working with a constructivist approach and became able to analyse the teaching, learning and assessment process. The following verbatim example from a participant’s report is clear evidence of the impact of applied ideas from a constructivist approach regarding teaching design and assessment practice:

What I discovered from the class task is that 20% of my learners did not remember the properties of the bending of a light ray when it moves from a light medium to another medium. That on its own **informed me** to review the grade 10 work on light and waves for them to easily understand how lenses function. About 85% were able to construct the two different lenses and light rays although 15% ignored putting arrows for the direction of light rays which is similar to a vector quantity with magnitude and direction.

They did not insert labels for the light ray in question 1 and the **intention** for question 2 and 3 was to assess their comprehension and construction skills. This implies that I intended to assess **different levels of high thinking ability** according to Bloom’s taxonomy. I continuously moved around the groups **monitoring** and ready to **give assistance** where necessary in the form of **scaffolding** (LG p. 27). The **questioning** in the task helped me to

learn about learners' pre-knowledge and about the gaps and misconceptions in that knowledge, so that the next move could address the learners' real needs (Black p. 68)"

The ideas highlighted in green in the verbatim example above relate to the constructivist view of guided discovery of learning in a social environment and the assumption that effective questioning is an essential part of mediated learning and scaffolding as a choice teaching strategy.

Other participants also confirmed the positive impact of the constructive choices in teaching strategies and that the interrelatedness of teaching and assessment results in better learner performance and a deeper level of understanding.

## 5.4 CONCLUSION

The research findings in *Chapter 5* revealed what the concerns are regarding teaching, learning and assessment in the focus group discussions, the importance of the integration of teaching and assessment in the discussions of the open questions, but the changes in planning, attitude and application and the impact of a constructive approach became evident in the participants' reports on the research project. The verbatim concluding remarks from one of the participants was a representative summary of the core findings regarding the impact of a constructive approach in instructional design and assessment practice:

Another thing I learned from doing the research is using an assessment task with the "main focus on learning" (in Reader, p. 72-73). In the past, I would not exactly explain why I gave learners class work. I only gave them class work and home work because the policy required me to do so. I would give a class work, mark it and give the books back to the learners with marks only. Then I would just write the memo of the class work on the chalkboard and learners would copy it in their books as remedial work. That would be all! Now I know that the purpose of class work is teaching and learning. Learners should learn while writing it, they should learn from the feedback you give them and the teacher should also learn from the feedback given by the learners. That would inform the teacher about what to do next. This reminds me of an idea that teaching and learning is not a linear process, but a cyclic one. The teacher should plan, teach and assess, then analyse. If the lesson did not go well, the teacher should change the plan, reteach and assess and analyse

again. I conclude by saying that getting involved in a programme like this had a positive impact on me as teacher. The programme helped me understand why it was necessary for the South African curriculum to change, how to make teaching and learning to be effective and – most importantly- how to assess for a purpose for learning.

## **6. CHAPTER 6: CONCLUDING PERSPECTIVES, RECOMMENDATIONS AND APPLICATIONS**

### **6.1 INTRODUCTION**

The overarching purpose of this investigation was to establish *in what ways the application of a constructivist approach can bring about changes in instructional design and assessment practice to result in effective teaching and learning*. Throughout the previous chapters of this thesis, the focus has been on different approaches to learning and views on the cognitive development of the learner, instructional design and the theoretical framework in which instructional design is done, which teaching strategies may fit a constructivist framework, the role of motivation in teaching, learning and assessment practices and the purposes and application of assessment. The investigation also aimed to determine the impact of constructive feedback on the teaching and assessment process.

The relevant literature was reviewed in *Chapters 2 and 3*. *Chapter 4* outlined the research design which was used in *Chapter 5* to engage the researcher as observer-participant in the research study, especially in the focus group discussion stage. This enabled the researcher to glean valuable information from the participants' practical experience in their particular teaching-learning environment as well as the framework they use in instructional design and how they practice assessment.

In this final chapter, the central objectives of this study, as referred to in *Chapter 1*, are systematically organized and will mainly comprise a summary of the major findings that emerged from the literature study and the empirical study. This will enable the reader to gain a holistic perspective and to simplify the results portrayed in *Chapter 5*, in relation to the theoretical propositions as outlined in *Chapters 2 and 3*.

The summary of findings will be followed by a discussion of areas in which future research is required. Finally, the limitations of this research study will be enunciated.



## 6.2 OVERVIEW OF THE RESEARCH PROCESS

*Chapter 1* introduced the general context under which this research was undertaken, which allowed the researcher to highlight the current educational sphere in South Africa and enabled the researcher to formulate the specific and general aims that guided the research. This was followed by a clarification of the problem questions and the purpose of the study. The methodology and design of the research was briefly outlined together with a summary of the chapter layout. The entire study was outlined in *Chapter 1*.

As mentioned in *Chapter 1*, the challenges of globalization in contemporary society call for new understanding and more innovative theoretical approaches which include new educational challenges to prepare learners to be responsible citizens and future workforce in the educational situation, (Christie, 2008: 41). The researcher also concurred with Erickson's (2007: 1) thought about the reality of these educational challenges which include fostering and developing critical, creative and conceptual minds in learners, but still included the required content in planning and teaching.

For these reasons and as described in the background to the study, the main aim of this study to find ways to deal with the educational challenges mentioned in preparing learners. The aim speaks directly to the instructional design and assessment which hold the educational practice in which teachers and learners are involved. The main aim was therefore the intent *to explore and find ways how the application of a constructivist approach in instructional design and assessment practice could result in effective teaching, learning and assessment (Chapter 1, paragraph 1.4: Aims of the research)*.

In order to achieve this aim a number of sub-aims were pursued, namely to -

- explore different approaches to learning and views on the cognitive development of the learner;
- investigate views on instructional design and the theoretical framework in which instructional design is done;
- identify particular teaching strategies for a constructivist framework;
- explore the role of motivation in teaching, learning and assessment practices;
- investigate the purposes and application of assessment;

- determine the impact of constructive feedback on the teaching and assessment process; and
- present a conceptual model to illustrate how a constructivist understanding and the application thereof may improve quality in instructional design and efficacy in assessment practice (*see Appendix H: Constructive model for instructional design and assessment practice*).

Each of these aims is an important part of the research findings and will be integrated and explained in detail in *paragraph 6.3* of this chapter.

In **Chapter 2** a literature study into the learning theories according to the behaviourist and cognitivist views was undertaken as the background for a discussion of constructivism as an approach to learning. The views of Bruner, Piaget, Vygotsky and Feuerstein (*paragraphs 2.3; 2.4; 2.5 and 2.6*) which could be aligned with a constructivist thought were emphasised. The role of modification of knowledge, the active involvement, the role of social setting and the impact of language especially received attention in the discussion about the approaches to learning.

**Chapter 3** covered the concepts of “*instructional design*” and “*assessment practice*”. In this chapter the researcher used the behaviourist and cognitivist views (*paragraphs 3.2.1 and 3.2.2*) on planning for teaching and the role of the teacher in instructional design to frame the characteristics of constructivist views on instructional design (*paragraph 3.2.3*). The literature study also included an investigation into teaching strategies (*paragraph 3.3*) with special reference to scaffolding, problem-solving, simulations and discussion (*paragraphs 3.4.1 – 3.4.4*) which the researcher in particular found suited to fit Constructivist thought on instructional design. The discussion of different taxonomies included reference to especially the 2001-revised version of Bloom’s taxonomy (*paragraphs 3.5.1 and 3.5.2*) and Gagné’s taxonomy of learning outcomes (*Table 3.1*). The psychomotor and affective domains were also referred to (*paragraphs 3.5.3 and 3.5.4*). The researcher especially came to realise the importance of the affective domain during the course of the investigation and the findings of the empirical research (*Chapter 5*). Some of the ideas are related to the social constructivist thought (*Chapter 2, paragraph 2.7*) on which further discussion follows in *Chapter 6, paragraphs 6.3.4 and 6.4.3*.

In *Chapter 4* the research design and methodology was explained and substantiated. The researcher had embarked on a qualitative approach in a three-stage investigation. The instruments used for data collection and the rationale behind the use of these instruments were explained in detail.

*Chapter 5* presented the findings from the empirical investigation. All the stages of the empirical investigation, which included focus group discussions, the use of open questions in whole group discussion sessions and the inclusion of a research report which served the dual purpose of exam equivalent and data for the final stage of the empirical study on the possible impact of a constructivist approach in instructional design and assessment practice were reported upon.

The statement of the problem for this dissertation has been recapped for the benefit of the reader:

*In what ways can the application of a constructivist approach bring about changes in instructional design and assessment practice in order to result in effective teaching, learning and assessment?*

The synthesis of the findings from this research and the consequent recommendations will be discussed in accordance with the objectives as stated in *Chapter 1, paragraph 1.4* and follow in *paragraph 6.3* below.

### **6.3 SYNTHESIS OF FINDINGS**

The objectives which were stated as sub-aims of the study and mentioned in *paragraph 6.2* above, are used as headings to synthesise the findings from the literature study as well as the empirical investigation which included the *Focus Group Discussions (Appendices A and B)* in Stage 1 of the study, the *Open Questions (Appendix C)* in Stage 2 of the study and the *Research Project (Appendix G – exam equivalent)* in Stage 3 of the study.

**6.3.1 Aim 1: To explore different approaches to learning and views on the cognitive development of the learner**

The literature review on approaches to learning affirms the different views on learning as a process which can result in behavioural, cognitive and social change. Of the approaches included in the investigation, only constructivist views portray the change in understanding content and concepts and the attachment of own meaning to enable a person to transfer the gained knowledge to new contexts.

**Table 6.1: Summary from literature study of behaviourist, cognitivist and constructivist views of learning**

<i>Approach</i>	<i>Behaviourist</i>	<i>Cognitivist</i>	<i>Constructivist</i>
<b>Views of learning theorists included in investigation</b>	Pavlov, Skinner	Chomsky, Piaget, Ausubel, Bruner, Gagné	Dreyfuss, Heidegger, Bruner (active process), Piaget, Vygotsky, Feuerstein
<b>View of the learning process</b>	Change in behaviour	Internal mental process (including insight, information processing, memory, perception)	Mediated process in social context, interaction between teacher and learner, negotiation of meaning
<b>Focus of learning</b>	Stimuli in external environment	Internal cognitive structuring	Learning and knowledge are interactive and dynamic Cognitive, affective and needs are acknowledged Learning takes place in social context
<b>Purpose in education</b>	Produce behavioural change in desired direction	Cognitive capacity to be improved, modification of existing schema	Learner to attach own meaning to concepts to enable knowledge application (transfer) to new contexts

<b>Educator's role</b>	Arranges environment to elicit desired response	Structures content of learning activity	Mediator to negotiate meaning and support development of the whole person Understanding scaffold Apply variety of methods
<b>Manifestations in learning</b>	Behavioural objectives Competency-based education Skill development and training	Cognitive development Intelligence, learning and memory as function of age Learning how to learn	Establish understanding and own meaning based on prior knowledge (schema) Application of different cognitive skills at different levels of demand

To sum up the main aspects of the table, it appears that where behaviourism treats the learner as an acting entity to build competency through behavioural changes, cognitivism recognises the importance of the *mind (cognition)* in making sense of the material with which it is presented and presupposes that the role of the learner is primarily to assimilate whatever the teacher presents. *Constructivism as an approach to learning* (cognitive development) holds the views that the learner has prior knowledge and therefore the influence of particular contexts should be acknowledged in the process where existing schemata can be modified / extended through learning.

In the search to find a possible link between cognitivism and constructivism, the ideas of Bruner were investigated (*Chapter 2, paragraph 2.3*). Bruner maintains that learners *construct new ideas* or concepts based upon their current or past knowledge. Therefore, the researcher acknowledges the connection to both cognitivism and constructivism as Bruner thinks about knowledge (cognitive structures) as a “*model we construct to give meaning and structure to regularities in experience*” (Bruner, 1962: 120). The ideas about *adapting to the changing environment through the process of learning and the learner selects and transforms information, constructs hypotheses, and makes decisions* appeared to imply significant links with learning as a social construct.

Regarding learning as a social construct, the social constructivist ideas regarding values, discussions, social structure, cultural and social knowledge appear to be noteworthy in the teaching-learning environment. Therefore cultures, beliefs, learning styles and language are taken into consideration in the teaching-learning situation as described in the Vygotskian notion that learners make use of their experiences to “*actively construct understanding in a way that makes sense to them*” (see Chapter 2, paragraph 2.5).

With the emphasis on the idea that learning best takes place through social interaction, particularly with knowledgeable others, the important link between *learning, language and understanding* is also stressed. Mediated learning, what Bruner (see Chapter 2, paragraph 2.3.1) describes as “active dialogue” and the Vygotskian notion of the learner as an active “*maker of meanings*” through entering into a dialogue with the teacher (see Chapter 2, paragraph 2.5) were found to be key elements in the impact of constructivism as approach on instructional design and assessment practices.

The literature review revealed that, when learning as a social construct is borne in mind, the cognition (schema) always provides structure to meaning and experiences and allows the individual to “go beyond the information given” to find personalised meaning in concepts, content and constructs. Therefore, understanding the role of cognition and metacognition in the application of a particular approach, the combination of approaches to learning becomes inevitable.

### **6.3.2 Aim 2: To investigate views on instructional design and the theoretical framework in which instructional design is done**

From the literature study on *instructional design in Chapter 3*, it appears that there is a place for each theory within the practice of instructional design, but depending upon the learning area, situation and teaching-learning environment. One may consider *cognitivism* as the dominant theory in instructional design and many of the instructional strategies advocated and utilized by behaviourists are also used by *cognitivists*, but for different reasons. For example, *behaviourists* assess learners to determine a starting point for instruction, while *cognitivists* look at the learner to determine their predisposition. The literature study confirmed that when designing from a *behaviourist / cognitivist* stance, the

teacher as instructional designer analyzes the situation and sets a goal or objective. Individual tasks are interpreted in terms of developed learning objectives which direct what should be achieved. In this approach the teacher as designer decides what is important for the learner to know and attempts to transfer that knowledge to the learner.

Assessment/evaluation, in the *behaviourist approach*, is characterised as a process during which it should be determined whether the criteria for the objectives has been met. Following this approach, one has to understand that a learning package is somewhat of a closed system, since although it may allow for some branching and remediation, the learner is still confined to what was designed and planned as a teaching strategy.

A *behavioural approach* can effectively facilitate mastery of the content (*knowing what*); where tasks for instance require a low degree of processing. *Cognitive strategies* prove to be useful in teaching problem-solving tactics where defined facts and rules are applied in unfamiliar situations (*knowing how*). The tasks requiring an increased level of processing (e.g., classifications, rule or procedural executions) are primarily associated with strategies having a stronger cognitive emphasis (e.g., schematic organization, analogical reasoning, algorithmic problem solving).

The literature study contained evidence that to design from within a *constructivist approach* requires the teacher/instructional designer to produce a product that is much more *facilitative in nature* than prescriptive. As seen from the ideas embedded especially in the *social constructivism*, the direction in the teaching process is determined more by the need and level of understanding of the learner. Assessment should therefore also be more formative in character because it does not depend on specific quantitative criteria, but rather the process which includes self-assessment of the learner.

*Constructivist strategies* are especially suited to dealing with ill-defined problems through reflection-in-action. Ertmer and Newby (1993: 50-70) declare that heuristic problem solving, personal selection and monitoring of cognitive strategies which are frequently used in for instance situated learning, cognitive apprenticeships and social negotiation as examples of tasks related to constructivist strategies which demand high levels of processing.

**Table 6.2: Theoretical approaches - strengths, weaknesses and perceived application**

Theoretical approach	Weakness when used in planning and instructional design	Strength when used in planning and instructional design	Associated application of approach
Behaviourism	The learners may find themselves in a situation where the stimulus for the correct response does not occur, therefore the learner cannot respond.	The learner is focused on a clear goal and can respond automatically to the cues of that goal and can identify particular objectives to achieve. The teacher can effectively facilitate mastery of the content (“ <i>knowing what</i> ”) – see Chapter 2, par 2.5.4 – (Ryle 1949: 58).	Tasks require a low degree of processing e.g., basic paired associations, discriminations, rote memorization) which are based on stimulus-response or contiguity of feedback/ reinforcement.
Cognitivism	The learner learns a way to accomplish a task, but it may not be the best way, or suited to the learner or the situation.	Cognitive strategies are useful in teaching problem - solving tactics where defined facts and rules are applied in unfamiliar situations (“ <i>knowing how</i> ” – see Chapter 2, par 2.5.4 – (Ryle, 1949: 58). The modification of the learner’s cognitive schemata results that a learner would be able to do a task consistently the same way (Feuerstein, 1990 and 1995 – Chapter 2, par 2.6).	Tasks require an increased level of processing e.g., classifications, rule or procedural executions which are primarily associated with strategies having a stronger cognitive emphasis such as schematic organization, analogical reasoning, problem solving.
Constructivism	In a situation where conformity is essential, so-called innovative divergent thinking and action may cause problems.	Constructivist strategies are especially suited to dealing with ill-defined (unstructured) problems through reflection-in-action. The learner is better enabled to interpret multiple realities and will also be better able to deal with real life situations. Due to the inclusion of problem-solving strategies (Chapter 3, par 3.4.3) learners may better apply their existing knowledge to a novel situation.	Tasks demand high levels of processing e.g., heuristic problem solving, application of various of cognitive strategies are Constructively learned with strategies advanced by the Constructivist perspective: guided discovery, social negotiation, simulations, interpretation of case studies.

The teacher as instructional designer is challenged to provide material that helps an individual to find divergent approaches to problem-solving. It is therefore necessary that teachers understand learning theories to enable them to provide the appropriate learning



environment. A basic understanding of what is going to be dealt with, how is it going to be dealt with and what is expected to be achieved, provide the learner with a guiding compass in unfamiliar knowledge situations. Having all that is mentioned, a teacher's planning could then provide opportunities for both learner and teacher to obtain and use information about progress towards learning goals. But having said that, the instructional design ought to be flexible enough to respond to initial and emerging ideas and skills, include strategies to ensure that learners understand the goals they are pursuing and the criteria that will be applied in assessing their work.

Though instructional design may have a *behaviourist tradition*, a *constructivist approach* provides new insights to the learning process in order for the teacher to adapt, change and alter the teaching-learning process. Saying that it must be acknowledged that the application of a *constructivist approach* to learning and the strategies associated with it, could enable the learner to construct his or her own meaning and understanding, but requires grounded knowledge. Following a *constructivist approach* the teacher as instructional designer should acknowledge the learner as a complex and diverse individual and incorporate mediation in the negotiation of meaning. All this involves a lot of challenges for the teacher as designer of instruction especially in an educational system where the teacher is not well-prepared enough to deal with continuous mediation of learning and to integrate teaching-learning-assessment as interrelated aspects of a single process.

Planning teaching from within a *constructivist approach* produces a much more facilitative and negotiated teaching-learning environment. The content is not pre-specified, teaching is learner-centred and assessment for learning is the aim of the triangular relationship between teaching-learning and assessment. Following a *constructivist approach*, assessment based on criteria, is seen as a process in which the teacher makes use of formative (constructive) feedback to direct learning and self-assessment of the learner.

In view of ideas derived from *social constructivism* (see Chapter 2, paragraph 2.7), the teacher should also be concerned with *designing teaching-learning environments which support the construction of knowledge*. Although the research process did not investigate conducive teaching-learning environments *per se*, it became clear from the literature study

(see Chapter 3, paragraphs 3.2.3 and 3.3.1) that if the following constructive planning efforts are included in the instructional design and the thinking about teaching and learning, a conducive teaching and learning environment may be established:

- A mediating process to negotiate and articulate mental models, using those models to explain, predict, and infer, and reflecting on their utility
- Social negotiation as a process of sharing a reality with others using the same or similar processes to those used in internal negotiation
- Consideration of the learner as an individual
- Authentic contexts for learning supported by case-based (simulated) problems which have been derived from and situated in the real world
- A variety of problem solving methods because problems in one context are different from problems in other contexts
- Collaboration among learners and with the teacher as mentor and mediator

Most models based on *social constructivism* stress the *need for collaboration among learners*, a view in direct contradiction to traditional behavioural and cognitive approaches. One Vygotskian notion that has significant implications for collaboration among learners is that of the zone of proximal development (ZPD) (Chapter 2, paragraph 2.5.2) which differs from Piaget's views of the fixed stages of development (Chapter 2, paragraph 2.4). As described in Chapter 2, paragraph 2.5.2 the zone of proximal development can be described as the distance between the developmental level of the learner (current state of understanding) and the level of potential development. The learner can reach the level of potential development through a process of scaffolding by a "more knowledgeable one" (teacher) and/or in collaboration with more capable peers. The importance of collaboration is also dealt with in recommendations for effective assessment practice as mentioned in paragraph 6.4.

As explained in Chapter 3, paragraph 3.2.3, an in-depth knowledge of approaches and theories to learning and teaching will make it much easier for the teacher as instructional designer to realize that some learning problems will require particular teaching strategies which include highly prescriptive solutions, whereas other teaching strategies will be more suited to learner-centred teaching-learning environments. The account of Reigeluth and Moore (1999: 66) is very helpful in this regard. They explain that the learners may operate

in a “problem space” or “instructional space”. Therefore, when learners encounter a knowledge or skill deficiency related to solving a problem they can “jump” into the “instructional space” to find guidance and support from the teacher in order to acquire the necessary knowledge and skills. This idea links with the discussion in *Chapter 3, paragraph 3.4.1* about scaffolding as teaching strategy to serve as temporary “instructional space” to guide and support the learner to new understanding.

It appears from the literature study that a *constructivist approach* may smooth knowledge acquisition when the teacher includes predetermined learning outcomes, maintains sequenced instructional interaction in the mediation of learning and to apply criterion-referenced assessment which holds the possibility of formative feedback.

### **6.3.3 Aim 3: To identify particular teaching strategies for a constructivist framework**

The researcher investigated whether scaffolding, problem-solving, simulation and discussion (*Chapter 3, paragraphs 3.4.1-3.4.4*) may be suitable as teaching strategies to fit into a constructivist framework especially for transfer and retention of knowledge in each of the four strategies. Another reason for exploring the applicability of the teaching strategies referred to, is in reaction to the misconception that a constructivist approach only refers to “hands-on/activity-based teaching”, and to also argue for guided discovery as a more effective strategy to ensure that learners become cognitively involved rather than only behaviourally active in discovering meaning.

As indicated in *Chapter 1, paragraph 1.1* the global trend to emphasize the skills and competencies needed to succeed in the workplace is more evident than ever, learners should portray the specific abilities that are appropriate for a global need. As Christie (2008: 41) and Erickson (2007: 1) explain, teachers are charged with preparing learners for this complex, interactive world. As stated in *Chapter 1, paragraph 1.1*, the reality of this educational challenge includes especially the fostering and development of critical, creative and conceptual minds of learners. The researcher therefore concentrated in the recommendations relating to teaching strategies on the application of these teaching

strategies to enable the transfer of knowledge in new contexts, innovation in thinking and new understanding to take place (*see paragraph 6.4.3.1*).

#### **6.3.4 Aim 4: To explore the role of motivation in teaching, learning and assessment practices**

Besides taking the individual learner into account (*Chapters 2, paragraph 2.7.1 and 3, paragraph 3.2.3*), the findings from the focus group discussions (*Chapter 5, paragraphs 5.3.1.1 – 5.3.1.4*) indicated that acknowledgement of the person and the efforts of the learner lead to self-determination (motivation) to take up challenges which previously seemed not manageable (*also see Chapter 2, paragraph 2.7.3*).

The findings from the research project (*Chapter 5, paragraphs 5.3.3.1 and 5.3.3.3*), revealed that the language used in the classroom and the way in which knowledge is negotiated in the classroom strengthen for these learners the substantial probability that they might succeed. The higher the probability, the more motivated these learners seem to be to pursue with the challenge ahead.

There appeared to be a direct link between motivation and the skills in the *affective domain* (*Chapter 3, paragraph 3.5.3*) which describe *emotional reaction* and target the awareness and development of *attitudes, interests, dispositions and feelings*.

A further investigation whether there is a semantic connection between emotion and motivation led the researcher to the explanation Myers (2004: 500) relies on in his article "Theories of Emotion". Myers refers to the fact that the English word "emotion" is derived from the French word *émouvoir*, which in turn is based on the Latin *emovere*, where *e-* (variant of *ex-*) means "out" and *movere* means "move", but the most interesting aspect of the explanation is that "motivation" is also derived from the word *movere*. For the sake of this study it is necessary to realise that motivation carries the characteristic of *intentionality* which also includes the idea that motivation will encourage the learner to move in a particular direction.

Some positive motivations to “move” the learner toward deeper understanding and improved performance appear to include a supportive, conducive teaching-learning environment in which learners learn to deal with multi-dimensional contexts in an environment where they feel safe enough to risk making educated guesses and venturing to find new meaning.

The findings from the research project (*Chapter 5, paragraphs 5.3.3.1 and 5.3.3.3*) supported Bruner’s argument (*Chapter 2, paragraph 2.3.1*) in his book *Toward a Theory of Instruction* (1966) that the teacher should strive as far as instructional design is concerned, to encourage (motivate) learners to discover principles by themselves, as a core aspect driving the success of teaching and learning. The participants stated that the way they structured content, involved the learners to think, discuss and explain their understanding of the content and the outcomes of an assessment task in their own terms, the more encouraged the learners participated in the teaching-learning situation.

The participants reported that where they simplified content and tasks, generating new propositions and increasing the manipulation of information, learners were more eager to attempt the tasks.

The findings from the research project (*Chapter 5, paragraphs 5.3.3.1 and 5.3.3.3*) brought evidence that a more motivated learner shows more persistence in the effort to complete a task successfully, which of course leads to enhanced cognitive processing of subject content and concepts. Some participants reported that the learners in the class seemed “more energetic” and “willing” to get involved in the classroom activities and in preparation for assessment tasks. There was even mention of learners who started learning groups in an attempt to gain more from each others’ understanding.

### **6.3.5 Aim 5: To investigate the purposes and application of assessment**

As previously mentioned in *Chapter 3, paragraph 3.6*, traditionally the most common assessment purposes are to grade, sort, to promote, select or mere evaluate – therefore classroom assessment was traditionally based on testing in which learners were expected to produce the correct answers (Borich and Tombari (2004: 1, 43, 44). However, in

constructivist assessment, *the process of gaining and assessing knowledge is viewed as far more than just a product, but rather as a process to create and illustrate own understanding, hence the necessity of mediation and the acknowledgment of the learner as an individual (Chapters 2, paragraph 2.7.1 and 3, paragraph 3.2.3).*

The constructivist views of assessment emphasise the concept of continuous, dynamic assessment where the interactive nature of teaching and learning is extended to the process of assessment. Assessment is seen as a two-way process involving teacher and learner in a dialogue to establish not only current levels of performance, but to negotiate ways in which the level of performance can be improved. This view accommodates the possibilities that the learners' achievement can be assessed, the quality of the learning process be monitored and the planning of teaching be reviewed.

In a constructivist sense, the role of the teacher in the teaching-learning-assessment process is to monitor knowledge construction; given the fact that learners need to construct their own knowledge networks or domains from classroom and other experiences (*Chapter 3, paragraph 3.6.3*). This role of the teacher also involves the assessment of prior information, the acquisition of new information and the transformation, elaboration and organization of such newly acquired information. Assessment thus becomes "*an organic part of teaching and learning*" where connections between assessment and learning, encourage a holistic approach to the analysis of assessment and its impact on the teaching-learning process.

### **6.3.6 Aim 6: To determine the impact of constructive feedback on the teaching and assessment process**

Assessment that encourages learning fosters motivation by emphasising progress and achievement rather than failure. By giving constructive feedback, teachers can use assessment to create a stimulating environment that encourages learners to learn, while guiding the learner's progress to own understanding of new concepts and content. This is possible when learners are given credit for what they can do, rather than being penalised for what they have not mastered yet.

In order to use formative feedback effectively, the assessment associated with it should not be seen as more frequent testing or as an informal assessment which limits the purpose of improving learning. Formative feedback should be seen as a process in which information regarding learning is evoked and used to modify the teacher as well as the learner's understanding of *how and on what level learning took place*. Therefore formative feedback needs to be specific, immediate and personally addressed to the learner as an individual. It is therefore necessary that teachers should pinpoint the learner's strengths and advise on how to develop them, be clear and constructive about any weaknesses and about how these might be addressed in order to provide opportunities for learners to improve upon their work. Formative feedback especially becomes worthwhile when there is a positive impact on effective learning.

It may well take several feedback cycles to register an impact. The feedback should therefore be continuous and automatic to ensure a quicker impact on the teaching-learning situation. Formative feedback may take on different forms of which moving about the room and using a conversational approach, may well be needed to strengthen the understanding of written feedback. A conversational approach fits perfectly into the mediated learning experience which was referred to previously as part of the Feuerstein model (*see Chapter 2, paragraph 2.6*).

The developmental nature of formative feedback seems to be corrective by design, in that teacher and learner can note what is completed successfully and correctly, but also be able to note what is still lacking in order to be able to complete the task successfully. Any improvement, however small, could direct and encourage all learners, no matter what level or stage of the learning cycle they are at.

The findings from the *research project (Chapter 5, paragraphs 5.3.3.1 and 5.3.3.3)* showed that when learners become self-motivated, they are better able to master the next step, even though that particular step has more challenges. In this way the learners turn into strategic and effective learners who take up responsibility for their own learning. The participants claimed that where they link feedback to the outcomes set, the assessment task and recognising the full range of achievements to the learners, the feedback became truly formative and carried a motivational effect which encouraged learners to achieve their

best, which in turn, strengthened the mediation process of assessment (*research project findings: Chapter 5, paragraphs 5.3.3.1 and 5.3.3.3*). The participants also reported that although either a numeric or alphabetic mark may be awarded to the answer to the assessment task, the reasons for awarding a particular mark guide further improvement.

**6.3.7 Aim 7: To present a conceptual model to illustrate how a constructivist understanding and the application of it may improve quality in instructional design and efficacy in assessment practice (see Appendix H: Constructive model for instructional design and assessment practice).**

An instructional design based on constructivist strategies (*see Figure 6.1*) assumes a process of knowledge construction in an open-ended learning experience. In this process the learner becomes a sense-maker and the teacher a cognitive guide who provides guidance.

It appears that the learning content, level of the learner and context will determine what works *where* and *how* and *for whom* and in *which situation* in order to get some focus in the approach to instructional design. It is necessary to consider the context before deciding on a specific methodology or a particular approach which would direct the line of thinking, whether the focus is on cognitive structural change, behavioural skills incorporated with an affective domain or creative thinking processes.

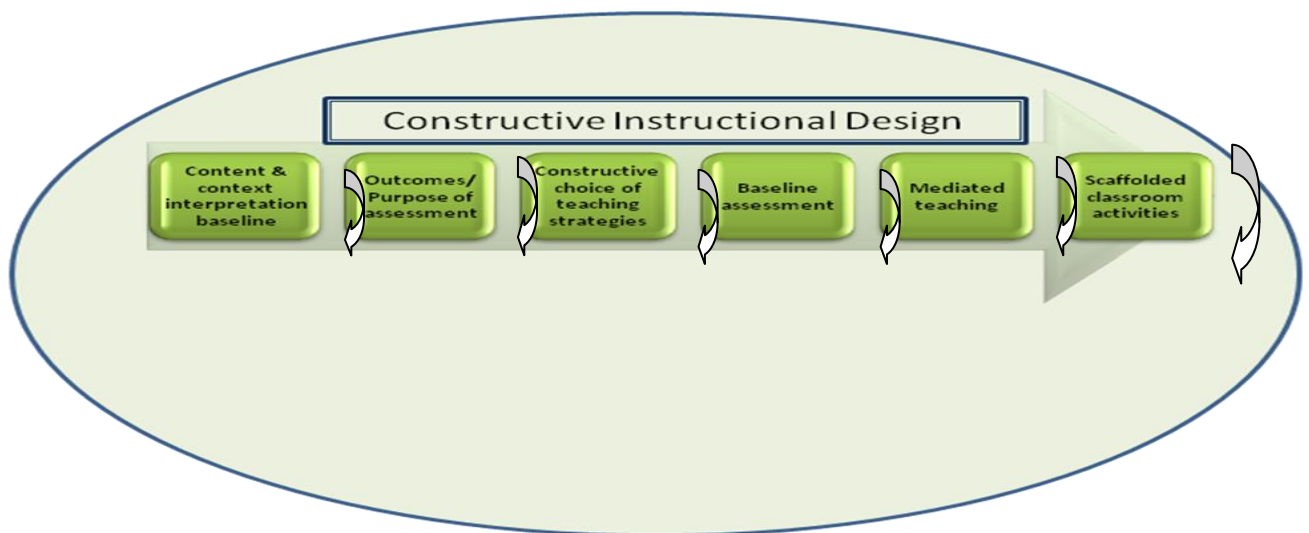
In the proposed design the teacher as instructional designer needs to acknowledge learning as a social construct and plan within a particular context for a particular context and allow diversity to guide choices in the instructional design.

Outcomes serves a dual purpose in this design, namely to give direction in the planning of the teaching and how to deal with the content, but also to guide the teacher to find the purpose of assessment for the particular content and level of learners. Determining outcomes has also much to do with the understanding of the cognitive pathways along which learners are expected to progress. The link between outcomes, cognitive levels of demand and assessment criteria needs to be stressed. The choice of teaching strategies (*see Chapter 3, paragraph 3.4 and paragraph 6.4.3 of this chapter*) needs to be informed by the



outcomes, content, purpose of assessment and the use of questions to give the teacher an indication of what content and skills have already been mastered and to link the current content to the learner's prior level of knowledge (*see Chapter 3, paragraph 3.6.2.1*). This action may also serve as a baseline exercise to determine further mediated teaching and learning. Classroom activities need to be part of the instructional design to support the negotiation of meaning, to involve the learner in the classroom activities and as preparation for assessment. In the constructivist classroom, both teacher and learner think of knowledge as dynamic and ever-changing and for that reason innovative thinking can be fostered.

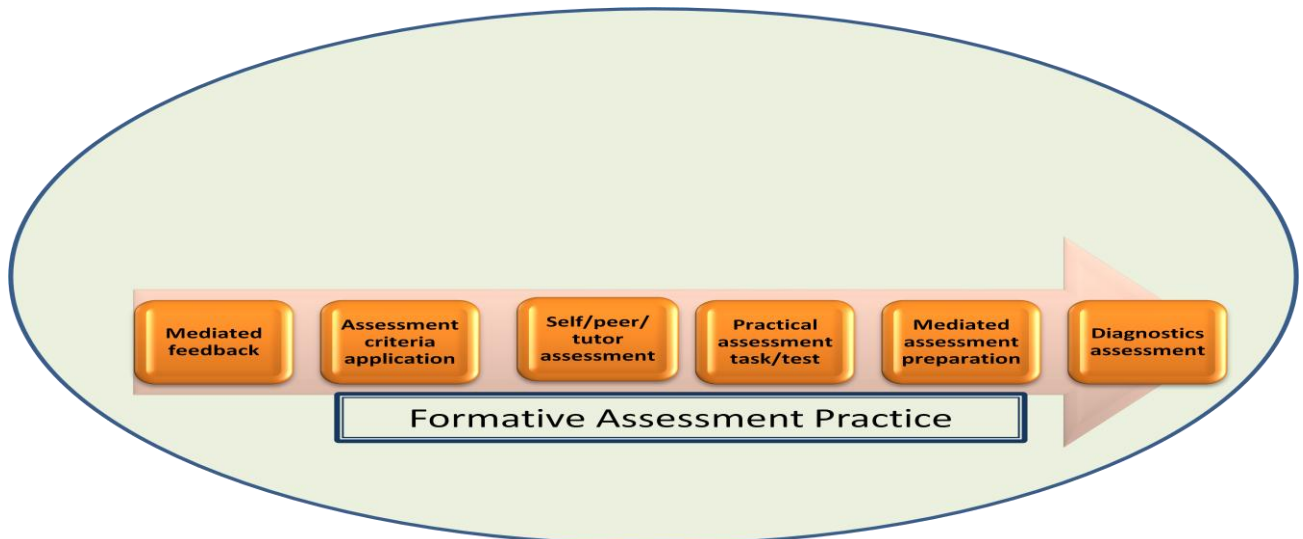
**Figure 6.1: Constructive instructional design**



Metacognition (*knowing about knowing*) appears to be the core of instructional design and assessment practice. This implies that the teachers' self-awareness, awareness of who the learner is and how the learner learns and is able to visualise the realisation of a teaching plan will be evident in the teaching-learning-assessment situation. Alignment of teaching and context, writing outcomes, the choice of teaching strategies and the decision when and how to apply particular strategies in the instructional design, are metacognitive actions. These can take many forms, including knowledge about *when and how* to use particular strategies for learning or for problem solving. Although the keys are indicated separately in *Figure 6.1*, it is noteworthy that all actions are linked to an indication of movement towards a particular goal. Furthermore instructional design interrelates with assessment which implies that both instructional design and assessment practice will impact the

teaching-learning-assessment process in general. *Figure 6.1* should therefore be read and interpreted together with *Figure 6.2* in order to see the impact and effect of a model based on constructivist principles on the educational environment.

**Figure 6.2: Formative assessment practice**



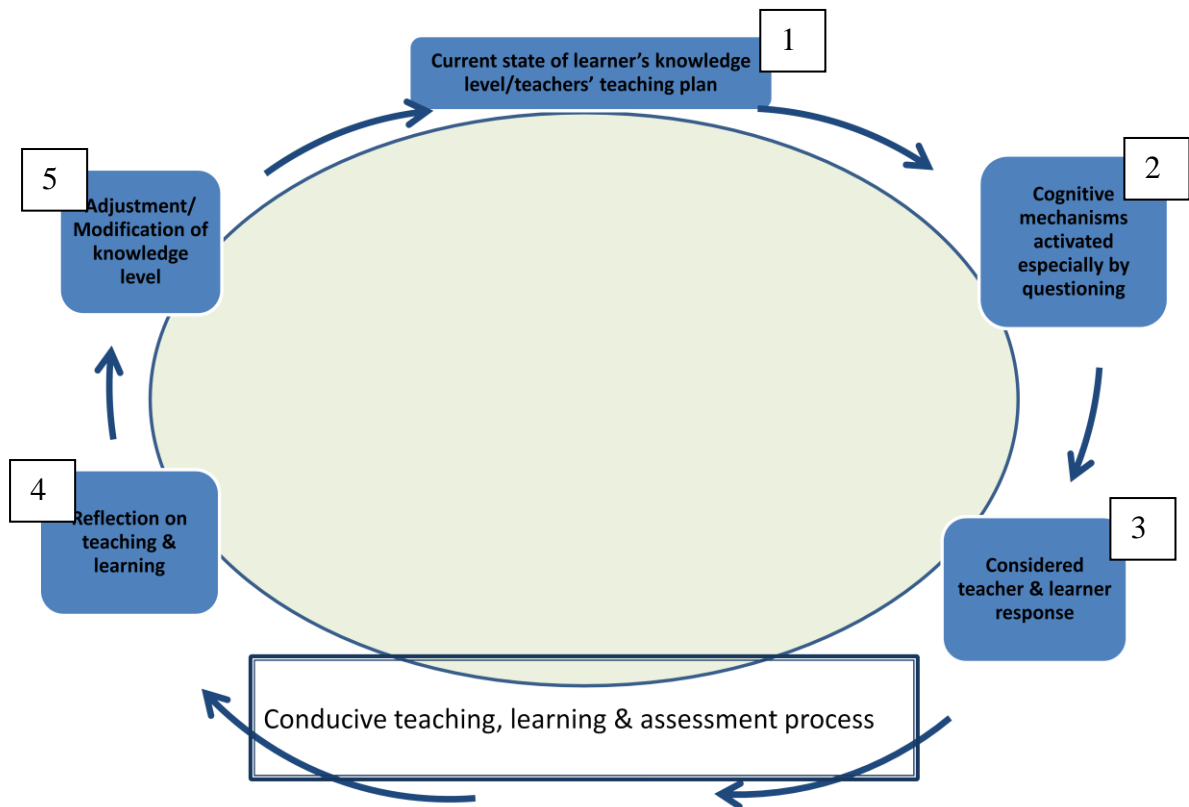
The researcher views constructive instructional design as a process to inform, support and base a formative assessment practice on. To acknowledge context, the importance of language in the classroom and to be able to pinpoint particular outcomes applicable to what ought to be taught, already gives guidance to writing assessment criteria and the structure in which formative feedback needs to appear. Assessment needs to be cumulative and expansive in nature and teachers should ensure that each assessment is based on criteria applied to a particular situation or ability in a certain context and that previous judgements or criteria are not applied in the new assessment context.

The teacher's decision on what the indicators or broad criteria for each outcome will be and to look for potential in a learner's performance to verify that he or she has the ability or knowledge expected in the outcome, gives evidence of the link between the set outcomes in the instructional design, the assessment criteria and application thereof at the end of the assessment process. Scaffolded classroom activities may also be used as diagnostic assessment exercise to inform the teacher of difficulties experienced at a particular stage of the teaching. The practical assessment task provides multiple opportunities to construct understanding. The task also provides opportunities to involve

learners in self- and peer-assessment exercises to enable them to reflect on their personalized understanding of the task and work at hand.

The linear and cyclic processes as indicated in *Figure 6.1* and *Figure 6.2* are designs for learners' learning experiences to have the same qualities as their assessment experiences – except that the instructional planning is designed primarily for mediated learning to take place and the development of knowledge and skills (abilities) and the formative assessment practice is designed to ensure that demonstration of such knowledge and skills becomes possible.

**Figure 6.3: Conducive teaching, learning and assessment process**



The processes, planning and application of the instructional design (*Figure 6.1*) needs to run concurrently in the thinking process and in most instances with the assessment practice (*Figure 6.2*) to bring about cognitive, affective and, where applicable, psychomotor development in five stages.

- **Stage 1:** the teacher becomes aware of the *current stage of knowledge* and ability which will inform the teachers' teaching plan. Awareness of the context, prior

knowledge of the learners, the diversity of learners in the teaching-learning situation, outcomes and the purpose of assessment direct the choice of teaching strategies and the approach to content and concepts at hand.

- **Stage 2:** The instructional design includes questions to determine the level of knowledge and to direct the negotiation of meaning. Effective questioning may *activate cognitive mechanisms or pathways* for learners to develop the basic conceptual knowledge in order to comprehend what the content and concepts entail and to be able to apply and demonstrate abilities to analyse and evaluate. If the teacher wants the learners to perform well, thinking about assessment of abilities in action is necessary. This implies that if a teacher later wants to assess the learners' problem-solving ability or the way they are able to interact, then the situation in the class should prepare them for such demonstration of performance. Classroom activities provide the opportunity for the teacher to support the learner to reach a higher level of understanding. Scaffolding as teaching strategy will be most applicable at this stage because the teacher can allow peer involvement, act as external source of information, direct the learner's attention to the particular starting point of the task, simplify the task/ activity by referring to different steps to follow and highlight main features.

Although mediation is viewed as a pivotal key in the whole teaching and learning process, the quality of mediation and the construction of meanings at this stage may greatly influence the learner's performance during assessment. The provision of emotional support impacts on the motivation of the learner and the confidence to take up challenging tasks.

- **Stage 3:** The considered *response of the teacher and learner* come in the form of question- and answer time, and discussion sessions to further a formative assessment process. Diagnostic assessment to determine understanding, misconceptions and "gaps" in understanding and ability may be an informal verbal discussion, a short test or practical class work deriving from the previous classroom activities. The responses of the learner to the teaching may also appear during the teacher's explanation of expectations and to inform the learner of the

assessment tasks. Effective questioning plays a vital role at this stage where the learner may question assessment criteria, asking questions about questions to obtain clarity about the expectations in the assessment task and to find whether the level of knowledge and ability place him or her in the position to achieve the set outcomes which link to the mediated assessment criteria.

- **Stage 4:** The development of the learner's ability to undertake self-reflection (self-assessment) and allow peer-assessment provides the learners the opportunity to reflect on teaching and learning. If the learner understands what is expected in the assessment criteria, has the knowledge of how to apply a particular set of outcomes in answering questions and is able to value own work, the learners' capacity for self-assessment enables them to be reflective and self-managing. Self-assessment is an ability in itself to develop, but will also enable the learner to be able to judge and to provide substantiated opinions. The ability to attach value and evaluate reminds one of the third and fourth affective domains as described in *Chapter 3, paragraph 3.5.3* and to follow in *paragraph 6.4.3.3.5*. Two levels in the affective domain are related to a developed ability for self-reflection and self-assessment. The levels referred to are -
- the affective domain of *valuing*, where the learner is expected to demonstrate a preference or display a high degree of certainty regarding an opinion; and
  - the domain of *organising*, where the learner has to combine different values, information, and ideas and accommodate them within his or her own schema by comparing, relating and elaborating on what has been learned.

The learner feeling confident enough to substantiate why he or she attached particular feedback to an assessment task or has the ability to place work done in a particular category of performance and use the assessment criteria to substantiate the placing, has achieved the affective domains of valuing and organising.

Formative feedback from the teacher may further strengthen the capacity of the learner for effective self-assessment (*also see Chapter 5, paragraph 5.3.3.3 and Figure 5.1*), because the teacher's feedback tells the learner how well he or she is performing from an outside perspective. The teachers' feedback may raise the

level of realistic self-critique, further develop the learner's ideas of thinking and learning and assist the learner to separate judgement of the self from performance. This may also help the learner to really focus on a realistic goal.

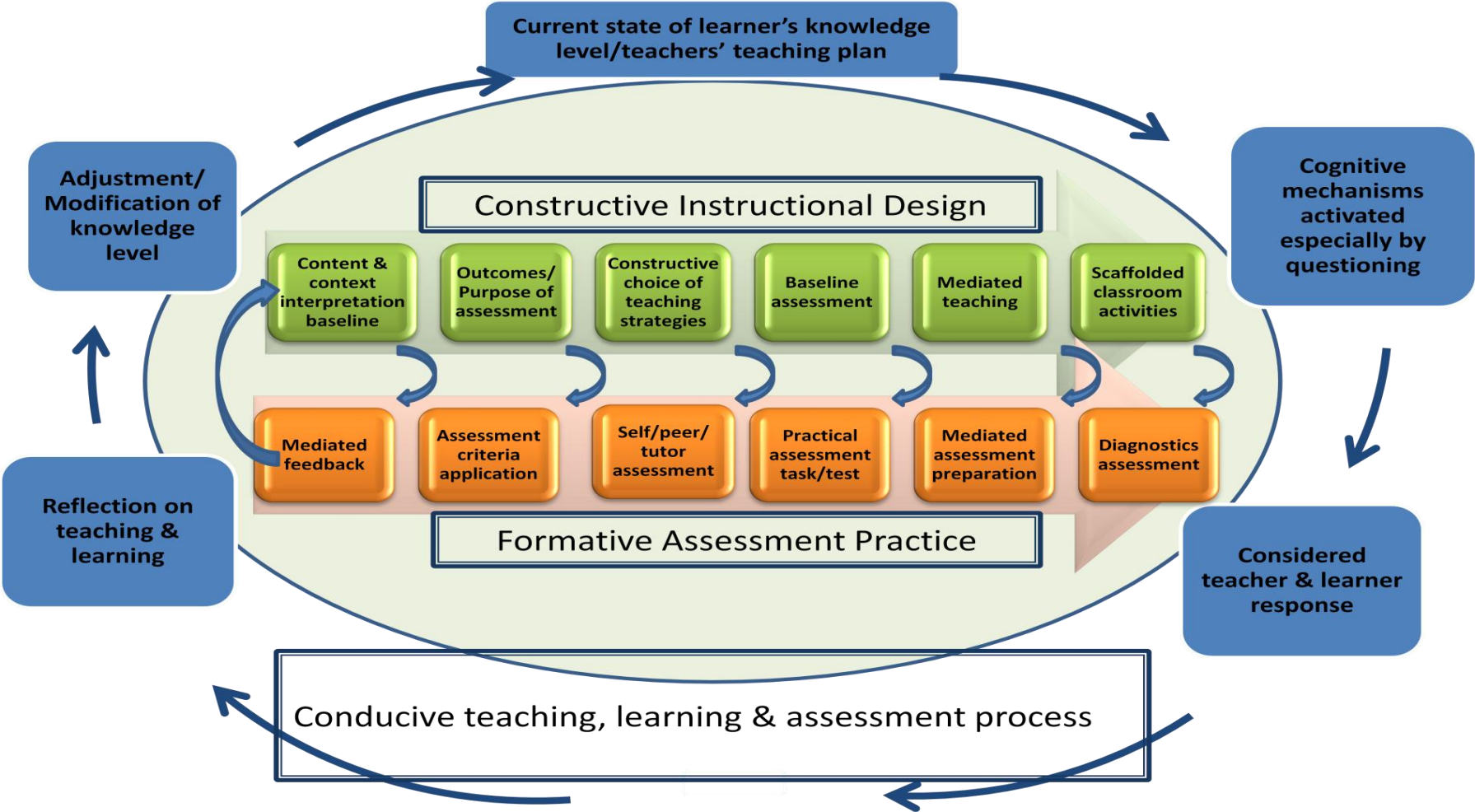
- **Stage 5:** Adjustment of instructional design and modification of the learner's understanding is a culmination of all the actions taken in stages 1-4. Stage 5 predetermines what would happen in a new stage 1 of the following cycle of teaching and learning. The researcher's idea of modification of knowledge level is based on the Feuerstein model as described in *Chapter 2, paragraph 2.6*. The researcher concurs with Feuerstein that cognition is a variable and that thinking patterns can change and consequently that intelligence is modifiable in order to apply knowledge in new and unfamiliar situations.

All the stages refer to and assume a level of *self-awareness of learning*. This *metacognitive knowledge* (also called metacognitive awareness) is what the learners know about themselves and others as cognitive processors. The stages are placed in such a way the regulation of cognition and learning experiences through a set of activities may assist the learners in their learning and which may further some *metacognitive experiences*. In instructional design this means that planning needs to include the way to approach a learning task, monitoring comprehension, and evaluating the progress towards the completion of a task – activities which interlink instructional design and assessment practices. Similarly, maintaining motivation to see a task to completion is also a metacognitive skill. Learners who demonstrate a wide range of metacognitive skills perform better in assessment tasks and exams and complete work more efficiently because of their continuous awareness and effectiveness. Individuals with a high level of metacognitive knowledge and skill seems to identify blocks to learning easier and earlier and may then change the approach to achieve or better achieve the goal.

For teachers, the ability of metacognition involves planning, monitoring, evaluating and revising thinking processes and how to design instruction. A higher level of metacognitive knowledge and skill for the teacher will enable knowing *what* (factual or declarative knowledge), knowing *when and why* (conditional or contextual knowledge) and knowing *how* (procedural or methodological knowledge) as referred to in *Chapter 2, paragraph*

2.5.4 and Chapter 3, paragraph 3.4.3. The internalization of knowledge (*know-how*) can be a result of the mastery of skills which occurs through the metacognitive activities of designing instruction in integrated teaching, learning and assessment in the educational environment.

Figure 6.4: Constructive model for instructional design and assessment practice





What the researcher proposes in the *constructive model for instructional design and assessment practice* (Figure 6.4), can be brought about by a deliberate programme of intervention in a teaching-learning situation where the learner *can learn to learn how to learn* and has the capability to modify the underlying structure of his or her cognition. What Feuerstein calls a “mediated learning experience”, the researcher wants to refer to as a conducive teaching, learning and assessment process. In this conducive teaching, learning and assessment process, language is pivotal for a learner to be able to broaden his or her understanding and to connect it with previous experiences and cultural background.

The researcher views the teacher as the mediator of learning and assessment by planning a process to help the learner to learn, to grasp new concepts and achieve a higher level of understanding. The task is not aimed at placing a specified body of knowledge into the learner's head, but for both of them to *discover* how the learner (and the mediator) learns and how to improve the learner's learning process in such a way that proof of learning will be evident in the assessment process.

The model further suggests the acknowledgement of the diversity of learners in a particular context to be able to demonstrate abilities and higher thinking skills required. The process of learning further assumes that the learner will involve himself or herself intentionally in the learning process and gradually develops a greater understanding of how best to learn. Furthermore it means that the teacher's involvement does not end at teaching, but stretches further into mediation in the assessment process as well. The process of learning has to be in the minds of both learner and teacher when teaching and assessment are planned. Learners should become as aware of the “*how*” of their learning as they are of the “*what*”.

Effective mediation implies that the teacher not only mediates particular meaning, but also encourages and conveys a feeling of the learner's potential competence to engage with the learning content or assessment task at hand. This further emphasises the interrelationship between motivation and whether learning will indeed take place in the absence of true motivation.

Over and above the focus on mediation per se, the learner as a unique, complex and multi-dimensional individual with unique needs which are embedded in a particular cultural

background, needs to be attended to in instructional design and assessment practice. This takes mediation of learning into another dimension where the learner's individual understanding of concepts requires specific planning from the teacher, specific use of language and the choice of particular purposes of assessment.

## **6.4 RECOMMENDATIONS FOR APPLICATION OF CONSTRUCTIVE INSTRUCTIONAL DESIGN AND ASSESSMENT PRACTICE**

### **6.4.1 Meso-level global application (Appendix I)**

The main theme of the 36<sup>th</sup> Annual Conference of the International Association for Educational Assessment (IAEA) (22-27 August 2010, Bangkok, Thailand) was “*Assessment for the Future Generations*”, which resulted in many debates and paper presentations about the need for assessment to meet the needs of the present and to prepare learners to meet future needs. The investigation into *a constructivist approach in instructional design and assessment practice* enabled the researcher to present a paper entitled “*The quest to turn on the taps in constructive assessment*” (see Appendix I) at the conference. Reference in this paper to the following drew attention and discussion from fellow attendees:

- The notion of metacognitive assessment
- Pedagogical ideas behind active learning
- The choice of teaching strategies
- The underlying methodological principles which may lead to improved and adapted classrooms
- Mediated learning and assessment practice which also acknowledge the affective domain

The researcher found in the further discussion on the latter, as well as the keynote lectures and presentations of fellow attendees at the conference, confirmed validity of the investigation into theoretical frameworks, especially *a constructive approach and the impact in instructional design and assessment practice*. Therefore it appears to be appropriate to refer to related presentations, lectures and discussions on some aspects dealt with in the

investigation of *a constructivist approach in instructional design and assessment practice*, which were referred to by several attendees during the conference.

Professor William Boyle (University of Manchester, UK) argued in the keynote address that there is a need for assessment to develop humanistic individuals and that there is a need for an *integrated assessment system to ensure improved learning*. In a follow-up discussion he argued the case for more *formative, interim and mixed mode assessments*. Professor Boyle contributed to the discussion on the need to enhance learning and instruction in a more systematic manner by focusing on teacher support for *continuous formative monitoring* of learner progress especially to prepare these learners for higher education and careers internationally.

A presentation by Dr Randy Bennett (ETS, USA) covered six interrelated issues in formative assessment which spoke directly to aspects dealt with in the investigation into *a constructivist approach in instructional design and assessment practice*. Bennett referred especially to the application and effectiveness of formative assessment (assessment for learning) and expressed concern about the limited attention to domain considerations in the conceptualization of formative assessment. He argues for more and more in-depth teacher-support to practise formative assessment in a larger educational system. The placing of the investigation in further teacher development and to have participants who were teachers in practice, make the inclusion of the findings of this study in programmes for further teacher development even more applicable. A discussion on the application of the research findings at national level, besides the general schooling system, follows in *paragraph 6.4.2*.

Regarding *exploring the role of motivation in teaching, learning and assessment practices* (*Aim 4: paragraph 6.3.4*) and the impact of constructive feedback on the teaching and assessment process (*Aim 6: paragraph 6.3.6*) in this study, research done by Edmund Song and Kim Koh from Singapore confirmed findings from the *focus group discussions* (*Chapter 5, paragraphs 5.3.1.1 – 5.3.1.4*) and the *research project* (*Chapter 5, paragraphs 5.3.3.1 and 5.3.3.3*). The preliminary findings of the Song and Koh-research (Program Book IAEA 2010:43) show that teachers who believe that learners are active participants in learning and who acknowledge learners' need to assess their own understanding, tend to use formative

assessment practices such as questioning for eliciting evidence of understanding, formative feedback as well as peer- and self-assessment (*see also Chapter 5, paragraph 5.3.3.1*).

Professor Gordon Stobart (Institute of Education, UK) argued in his keynote address that sustainable assessment needs to be *as constructive as possible*. This was supported by Tom Corcoran (CPRE, USA) in his special lecture on the implications of learning progression for assessment. Corcoran (Program Book, IAEA 2010: 38) made out a case for teachers' deeper apprehension of learning and learning progression towards specific levels of understanding. He pointed out that teachers need to understand the cognitive pathways along which learners are expected to progress, because these pathways, progressions or trajectories can guide the *design of both instruction and assessment*. Corcoran (Program Book, IAEA 2010: 38) mentioned that formative assessment provides feedback to teacher and learners about the gaps between learners' actual and desired performances. Corcoran's reiteration of the importance of understanding learning progression in order to mediate effective learning supports the findings in the literature study and the empirical research done in this investigation into *a constructivist approach in instructional design and assessment practice*. It became clear that knowledge of what "learning" is and *what* should be learned and *how* it should be learned, will support instructional planning and act as a touchstone for formative assessment. It also seemed that Corcoran's call for empirical and action research to assist teachers in understanding the learning progress in specific domains, instructional design and formative assessment practice became partially realised in this study on *a constructivist approach in instructional design and assessment practice*.

#### **6.4.2 Macro-level national recommendations and application**

Raising the standards of learning that are achieved through school education is an important national priority. Thus the body charged to carry out government policy on assessment had no strategy either to study or to develop the formative assessment of teachers. It follows from this view that several changes are needed. Policy ought to start first and foremost with the recognition that the *prime locus for raising standards is the classroom*, so that the overarching priority has to be to promote and support *change within the classroom*. Learning is driven by what teachers and learners do in classrooms. Here, teachers have to manage complicated and demanding situations, channelling the personal, emotional and social

pressures amongst a group of 30 or so learners in order to help them to learn now, and to become better learners in the future. Standards can only be raised if teachers can deal with the challenges of teaching more effectively – what is missing from the policies is any direct help with this task.

The national initiatives regarding raising the bar in assessment practice the past few years, the initiatives to improve school planning and management, national assessment at Grade 9 level, the 2014 target setting and the intention to assess the Curriculum and Assessment Policy on Learner Performance (Grade R-12) and teacher capabilities and to refine and develop documents and plan for further implementation in the next 5 years, are all acknowledged and valued. However, the need for policy to become practice is still an urgent need.

Language and the mediation of learning in the classroom has received attention since 1997 through the Language in Education Policy (LiEP), reports from ministerial committees and several national colloquiums, but the findings from this study confirmed the need for developmental programmes to ensure enhanced mediated teaching and learning.

During the 2010-IAEA Thailand conference, there was a reference to research done by Black and Wiliam (1998b: 7-74) which showed that high quality formative assessment does have a powerful impact on learner learning. Black and Wiliam report that studies of formative assessment show an effect size on standardized tests of between 0.4 and 0.7, which is larger than most known educational interventions. Black and Wiliam also found that most classroom testing encourages rote and superficial learning. Teachers do not help each other become good assessors, and they often emphasize quantity of work over high quality. Real assessment practices are often harmful: marking and grading are overemphasized while giving useful advice is underemphasized, and comparing learners competitively causes low-achieving learners to believe they cannot learn. Teachers, it turns out, generally replicate standardized tests in their own assessment practices and therefore lack sufficient information on their learners. The research also confirmed that formative assessment is particularly effective for learners who have not done well in school, thus narrowing the gap between low and high achievers while raising overall achievement. Unfortunately like the case in the research, most teachers still lack the will or knowledge to plan and include teaching strategies

to support constructive teaching and assessment or lack the ability to apply formative assessment.

The researcher recommends that to start effectively applying a classroom-focused policy, requires emphasis firstly on several essential elements, namely the quality of teacher-learner interactions, the stimulus and help for learners to take active responsibility for their own learning, the particular help needed to move learners out of the so-called “low-attainment” trap, and the development thereby of the habits needed by all if they are to become capable of life-long learning. Improvements in formative assessment which are within reach can contribute substantially to raising standards in all of these aspects. These actions may also raise the quality of teachers’ assessment tasks and help them to resolve the deep social and personal problems that many teachers have about their roles in assessment. The researcher acknowledges the fact that enhancing the quality of learning through improved formative feedback will take some classroom time, which is already a crucial issue where teachers feel under pressure to “cover” a statutory curriculum, but if policy makers and others can give direct help and support to the everyday classroom task of achieving better learning, then surely these ways ought to be pursued vigorously, especially by using exemplars of already existing good practice.

The investigation done on theoretical frameworks, assessment practice in general and specifically effective use of questions in assessment, have found credible application outside the normal schooling system. The researcher used the findings from the entire empirical study concerning difficulties experienced in assessment practice with regard to effective questioning, quality assessment tasks and formative assessment practice in practical developmental workshops as guidance to examiners and moderators involved in the National Certificate (Vocational) and the Adult Basic Education and Training sector. The workshops were based on a constructivist instructional design in which the researcher involved the attendees in guided discovery sessions, problem-based learning and discussion sessions where attendees could organise information actively, looked for internal patterns and related all new knowledge to prior knowledge and practical experience. The researcher used mediation of learning as the point of departure to work with cognitive demands. This can be seen in view of the reference to cognitive pathways which may guide the *design of both instruction and assessment as referred to in paragraph 6.4.1.*

The researcher adapted the 2001- revised version of Bloom’s taxonomy and used this adapted version in the work sessions to demonstrate the applicability of the taxonomy in both the setting and evaluation of questions and assessment tasks which include case studies, simulations and scenarios. The challenge of setting good questions to cover a variety of demands became a much more manageable task for the attendees. The attendees testified to the impact of applying the adapted taxonomy and confirmed that their comprehension of cognitive demand and expectations and how activities can be planned in a continuous assessment practice, will greatly be to the advantage of the learner as well.

**Table 6.3: Taxonomy of thinking skills and applied cognitive demand levels**

<b>Taxonomy of thinking skills –and levels of cognitive demand based on the Revised Bloom’s Taxonomy</b>			
<i>Category</i>	<i>Definition</i>	<i>Action Words</i>	<i>Examples of application (science and mathematic fields)</i>
<i>Creation (Synthesis)</i>	Reform individual parts to make a new whole, creating tasks, learners generate, plan, and produce.	Compose, design, invent, create, hypothesis, construct, forecast, rearrange parts, imagine, generate, compose, examine, develop...	Complex reasoning involving, for example, synthesis, critical argument and novel or abstract contexts. Generalise patterns observed in situations, make predictions based on these patterns and/or other evidence and determine conditions that will lead to desired outcomes. Working with complex problems involving insight and logic leaps; formulating new equations (using all unknowns); creating new solutions to problems; redesign.
<i>Evaluation</i>	Judge value of something regarding criteria. Support judgement; challenges for deeper meaning.	Judge, evaluate, give opinion, viewpoint, prioritise, recommend, criticize, choose/decide, estimate, judge, predict, rate/score, select, support, justify, argue, conclude, why do you think...	Opinion, giving general critique, making judgement (evaluate), critique, and recommend by considering all material available; weigh possibilities and make recommendations.  Substantiated opinion, critique solutions to problems and statements about situations made by others.
<i>Analysis</i>	Understand how parts relate to a whole. Understand structure and motive. Note fallacies.	Investigate, classify, categorise, compare, contact, solve, relate, distinguish, report on, sort, debate...	Perform procedures in unfamiliar contexts, unseen problems by demonstrating higher level understanding and cognitive processes; sketch graphs; construction or interpretation of schematic diagrams; problems with

<b>Taxonomy of thinking skills –and levels of cognitive demand based on the Revised Bloom’s Taxonomy</b>			
<i>Category</i>	<i>Definition</i>	<i>Action Words</i>	<i>Examples of application (science and mathematic fields)</i>
			two or more steps; counter-intuitive relationships; qualitative proportional reasoning; more complex relationships or explanations; 2 steps to arrive at answer basic logic leaps; interpretation of table of data; acid-base or redox equation; complex abstract representation; combination of concepts across sub-fields; interpreting and extrapolating from solutions obtained by solving problems based in unfamiliar contexts; using higher level cognitive skills and reasoning to solve non-routine problems; being able to break down a problem into its constituent parts – identifying what needs to be solved and then using appropriate methods in solving the problem.
<i>Application</i>	Transfer knowledge learned in one situation to another; familiar or new.	Demonstrate, use, guide, map, chart, build, cook, arrange, illustrate, apply, sketch, locate, construct, solve...	Perform well-known procedures in familiar contexts. Identify a procedure to solve the problem from the way the problem is posed. Use available information. Draw for instance data graphs for data provided; draw algebraic graphs for given equations. Measure for instance dimension such as length, time and weight using appropriate measuring instruments sensitive to levels of accuracy.
<i>Understanding (Comprehension)</i>	Demonstrate a basic understanding of concepts and curriculum. Translate to other words; recall particular information; make own meaning; understanding of previously acquired information in a familiar context; regarding information gathering: change or match information; regarding use of knowledge: distinguish	Give examples, explain, summarise, translate, show symbols, edit, define, discuss, identify, interpret.....	Simple relationships; simple explanations; 1 step answers; derivation of units, simple applications; interpretation of realistic diagrams Identify principles which apply in a novel context; explaining



<b>Taxonomy of thinking skills –and levels of cognitive demand</b> based on the Revised Bloom’s Taxonomy			
<i>Category</i>	<i>Definition</i>	<i>Action Words</i>	<i>Examples of application (science and mathematic fields)</i>
	between aspects, compare and predict, defend and explain		
<i>Remembering (Knowledge)</i>	Ability to remember something previously learned, recognise, recall relevant information	Tell, recite, list, memorise, remember, define, locate, name, match, recall, repeat, state, outline, repeat...	Very simple recall; state a simple law or equation; recognize content in multi-choice questions (MCQs), for instance: read information directly from a table (e.g. the time that bus number 1234 departs from the terminal). Know and use appropriate vocabulary such as equation, formula, bar graph, pie chart, Cartesian plane, table of values, mean, median and mode. Know and use formulae such as the area of a rectangle, a triangle and a circle where each of the required dimensions is available.

The attendees at the workshops firstly explained their understanding of the level of demand and had to mention what is expected regarding knowledge and skill in the particular level. A work session with practical examples followed during which the attendees had to identify cognitive demands by key word or action required in a particular item. To complete the exercise the attendees had to link example question with action word and organize these according to the level of demand. Attendees reported that the exercise enabled them not only to work with levels of demands in relation with expectations in outcomes, but also to make use of effective questioning in assessment tasks which also improved the quality and level of assessment in general.

The taxonomy also came into use to evaluate test items regarding the requested level of demand and weighting attached to demand in different subject fields.

### **6.4.3 Micro-level classroom recommendations and application**

The multi-lingual, multi-cultural, diverse teaching-learning situation in South Africa calls for diversity in approach as well. It became clear from the investigation that a radical

constructivist approach is not at all suitable for the South African context, but that the importance of language in the classroom and the negotiation of meaning embedded in a social setting are important factors to take into consideration when striving towards effective assessment based on structured instructional design. A choice for *guided discovery* and to give learners the opportunity to express their understanding, allow classroom dialogue that focuses on exploring understanding, and give feedback which includes opportunities to improve and guidance on how to improve, appear to be effective choices to make in instructional design and assessment practice.

In the following paragraphs the researcher offers recommendations regarding aspects of a constructivist approach that can be applied in the classroom to improve the applicability of teaching strategies, enhance instructional design choices as well as the efficacy and quality of assessment practice.

#### **6.4.3.1 Constructive choice of teaching strategies**

The researcher concurs with the Vygotskian claim (*Chapter2, paragraph 2.5*) that teaching is good when it proceeds ahead of the development of the learner. This means that teachers should challenge learners with tasks that refer to skills and knowledge just beyond their current level of mastery – a recommendation in line with Vygotsky’s zone of proximal development (*Chapter2, paragraph 2.5.2*), but it also emphasizes the importance of the choice of an appropriate teaching strategy to suit the choice of task. The choice of teaching strategy should reflect the best of what teachers know about how learning occurs, especially because learning involves a complex system of interactive processes that includes different types of thinking and dimensions of learning.

As stated in *Table 6.1*, constructivist strategies are especially suited to dealing with ill-defined (structured) problems because the learner is more enabled to interpret multiple realities. Preparing learners for the future will require teachers to apply ***problem-solving as teaching strategy*** to enable learners to also work with moderately and ill-structured problems. Research by Mayer (1983), Bransford and Stein (1984) and Palumbo (1990) as referenced by Kirkley (2003) show that well-structured defined problems are easier to solve and knowledge becomes much easier to apply, than is the case with moderately or ill-defined

problems. In general teaching moderately or ill-structured (defined) problem-solving is also more complex and time-consuming than teaching well-structured problem solving – the reason being the increased emphasis on declarative knowledge (*Chapter 3, paragraph 3.4.3*), mental modelling and inductive strategies.

***Problem-solving as teaching strategy*** models constructivist ideas and characteristics in many ways, of which learner-centredness and active engagement with content, the development of reasoning and finding meaning are just a few. The teacher can, for instance, use problem-solving to guide learners to recognise the difference between what is a fact and what is an opinion. With reference to Blooms revised taxonomy (*Chapter 3, paragraph 3.5 and Figure 3.2*), the identification of a fact aligns with basic conceptual knowledge and the recognition of what an opinion is, aligns with evaluation as cognitive demand. To reinterpret Gagné’s taxonomy of learning outcomes (*Table 3.1*) and rephrase Gagné’s (1985:188) theory of instruction and his questions about the place of intellectual skills, organized verbal information and cognitive strategies as a constructivist application of problem-solving as teaching strategy, the researcher recommends as follows:

- The teacher’s mediation of the demands at a particular cognitive level as defined in the revised Bloom taxonomy (*Chapter 3, paragraph 3.5*), will assist the learner to apply the intellectual skill required in problem-solving. Well-defined problems usually demand the comprehension of conceptual knowledge whereas ill-defined problems require the learner to analyse the core aspects of the problem and to reorganize these aspects in a systematic way in order to make sense of the problem. The engagement in the latter will be more difficult and therefore requires from the learner to understand the cognitive demand required from him or her in the particular situation.
- When a learner understands the levels of demand, the use/application of skills associated with these levels of demand becomes easier. In this instance the researcher concurs with what Gagné (1985:189) refers to as the “switch among a large number of fairly specific intellectual skills” because the learner’s understanding of his or her own skill and the metacognitive awareness of the application of such skill implies that the learner will be able to understand another and new context.

- The learner’s engagement with the problem is to understand the metaphor in which a problem is stated. The teacher may even use an analogy to mediate the “language” or “setting” of the problem. To assist the learner to organize or reorganize the problem in terms more accessible to the learner, makes an ill-defined problem an opportunity to learn through the problem to transfer skill and knowledge to other contexts as well.
- Through questioning the problem, the learner not only learns to work with and through the problem to arrive at a solution, but will be able to apply the same skill in other assessment tasks where a learner may *ask questions about a question* to find ways to work with and then be able to answer the particular question more effectively.

It should be kept in mind that when working with problem-solving, the connection to the world around the learner and to make everyday application a reality is of great significance.

#### **6.4.3.2 The necessity of questions and questioning in enabling learning**

A particular feature of the talk between teacher and learners is the asking of questions by the teacher. From the findings in the *focus group discussions* (Chapter 5, paragraphs 5.3.1.1 – 5.3.1.4) and the participants’ reports in the *research project* (Chapter 5, paragraphs 5.3.3.1 and 5.3.3.3) this direct way of monitoring whether learning is taking place is often unproductive. One common problem that the participants reported was that they cannot tolerate silent thought and to wait for learners to come up with answers. The participants mentioned that they will most often approach the “talkative ones” in the classroom to come up with an answer or give an answer just to be able to continue with the teaching. It became clear from the *focus group discussions* (Chapter 5, paragraphs 5.3.1.1 – 5.3.1.4) that the participants (teachers) will consequently rely predominantly on questions of fact, because these type of questions probably will produce quicker answers. Another consequence according to the *focus group discussions* (Chapter 5, paragraphs 5.3.1.1 – 5.3.1.4) is that some learners, especially those who are conceptually strong, will answer the factual questions quickly and nobody else will attempt an answer for fear of making a mistake. Another consequence is that teachers will not even attempt to pose higher-level demand questions to the learners in the anticipation that they are going to wait for answers or won’t get any learner

to attempt to answer the question. Changing the formulation of the question to include another level of demand, may probe much deeper thinking and discussion in the classroom. For instance a science teacher who had begun lessons with questions such as “*What is this instrument and where would you find it?*” (factual, basic conceptual) can change and ask questions such as “*Why do you think these two plants have grown differently?*” (comprehension and application of thoughts).

Small changes like the way how questions are formulated, the use of various levels of demand in questions and even an aspect like the “wait time” for verbally asked questions impact on performance and how effective assessment is. The researcher found the point of improvement to which Black et al. (2003: 33-42) refer to improve learner performance as helpful. Black et al. (2003: 33-42) report on research findings that if “wait time” is increased in the classroom, the learners answer with more confidence, the answers are longer and include alternative explanations, while some learners even improve the attempts of others. Although increasing “*wait time*” may seem difficult for teachers to apply due to the habitual desire to add something immediately after the answer is given, the ones who persevere come to see the value in the changed approach. The teacher who increases own “wait time” in response to learners further provides the opportunity for sustained discussion in the classroom which facilitates learning.

Teachers may also involve learners and give them time to respond, by asking them to discuss their thinking in pairs or in small groups so that a respondent is speaking on behalf of others, giving learners a choice between different possible answers and asking them to vote on the options, or asking all to write down an answer and then reading out a selected few. It is essential that questions can be used as part of a dialogue to evoke thoughtful reflection in which all learners can be encouraged to take part, for only then can the constructive process of teaching, learning and assessment start to work.

Teachers can also gain confidence in asking effective questions by discussing and practice questions with colleagues and the learners. Effective questioning improves the quality of the task at large, but also encourages learners to give thoughtful answers and not simply agree or disagree with a statement. In such instances learners may struggle to justify their answer because they do not really understand what they agreed with. A question like: “Some people

describe friction as the opposite of slipperiness. Do you agree or disagree?” was changed to “Some people describe friction as the opposite of slipperiness. What do you think?” which according to the research done by Black et al. (2003: 33-42) encourages learners to provide more substantiated answers.

### **6.4.3.3 Constructive choices of the purpose and application of assessment**

Assessment should focus on learners' use of knowledge and complex reasoning rather than their recall of low-level information and therefore the rethinking of the purpose and process of assessment is necessary.

The research findings showed that instructional design, teaching and formative assessment are indivisible. Therefore, thinking about constructive assessment needs to view assessment as an integral part of the teaching-learning situation embedded in and through language and to be used as an opportunity to provide a modified and personalised understanding of knowledge. Constructive assessment provides an opportunity to diagnose, guide and motivate also through constructive, formative feedback in order for learning in and through assessment to take place. This does not mean that one assessment task can be used to fulfil all these purposes, but to identify in the teaching-learning-assessment process some problematic areas which provide the opportunity to support and could be used to follow up in future tasks and feedback to the learner.

The researcher also recommends the rethinking of the choice of tasks for class and homework. Assessment tasks have to be justified in terms of the learning aims that they serve, and they can only work well if opportunities for learners to communicate their evolving understanding are built into the planning. Discussion, observation of activities and marking of written work can all be used to provide the opportunities, but it is then necessary to look at, or listen carefully to, the discussions, the writing, the actions through which learners develop and display the state of their understanding.

#### **6.4.3.3.1 Assessment for diagnostic and formative purposes**

The use of assessment tasks to diagnose enables the teacher to adjust teaching to suit the current level of understanding, or to identify whether the learner has misunderstandings about particular concepts or lacks a particular skill in order to improve understanding. The results of diagnostic assessment indicate the planning for teaching and assessment in finding answers to the “why”, “what” and “how” questions of assessment. Therefore the teacher’s explanation of the reasons for particular assessment tasks and the content and level of questioning associated therewith, is of core significance. This also implies that the teacher will find content specification (“what”) for particular tasks easier and that the format (“how”) in which the assessment will be conducted becomes clear. To improve the effectiveness of assessment for diagnostic purposes, will require that the learners exactly understand the expectations in the task otherwise the teacher will not be able to clearly identify and pinpoint the problematic areas. The dual aim of diagnostic assessment will then be for teacher and learner to establish what they know, what they want and have to know and do, what was already mastered and how it is known that the content and skills were mastered.

A variety of tasks to find out where and with which particular content the learners are struggling, guides the teacher to the choice of teaching strategy or to change the teaching strategy used in particular situation to result in constructive and effective teaching and learning.

Research has shown that if learners are given only marks or grades, they do not benefit from the feedback on their work. The worst scenario is one in which some learners get low marks this time, they got low marks last time, they expect to get low marks next time, and this is accepted as part of a shared belief between them and their teacher that they are just not clever enough. Feedback has been shown to improve learning where it gives each learner specific guidance on strengths and weaknesses, preferably without any overall marks. Thus, the way in which test results are reported back to learners so that they can identify their own strengths and weaknesses is a critical feature. Learners must be given the means and opportunities to work with evidence of their difficulties. Thus, for formative purposes a test at the end of a block or module of teaching is pointless in that it is too late to work with the results.

#### **6.4.3.3.2 Assessment as guidance and motivation through a mediating process**

Opportunities for learners to express their understanding should be designed into any piece of teaching, for this will initiate the interaction whereby formative assessment aids learning.

Dialogue with the teacher provides the opportunity for the teacher to respond to and re-orient the learner's thinking – which does not mean that the teacher requires a particular response and lacks the flexibility or the confidence to deal with the unexpected, will attempt to direct the learner towards giving the expected answer. Rather, the dialogue referred to here is thoughtful, reflective, focused to evoke and explore understanding, and conducted so that all learners have an opportunity to think and to express their ideas.

Assessment that encourages learning fosters motivation by emphasising progress and achievement rather than failure. By giving positive feedback, teachers can use assessment to create a stimulating environment that encourages learners to learn, while guiding the learner's progress to own understanding of new concepts and content. This is possible when learners are given credit for what they can do, rather than being penalised for what they have not yet mastered.

In order to use formative feedback effectively, the assessment associated therewith should not be seen as more frequent testing or as an informal assessment which limits the purpose of improving learning. Formative feedback should be seen as a process in which information about learning is evoked and used to modify the teacher's as well as the learner's understanding of how and at what level learning took place. Therefore formative feedback needs to be specific, immediate and personally addressed to the learner as individual. It is therefore necessary that teachers should pinpoint the learner's strengths and advice on how to develop them. Also, teachers should be clear and constructive about any weaknesses and how these might be addressed in order to provide opportunities for learners to improve upon their work. Formative feedback becomes especially worthwhile when there is a positive impact on effective learning and how the planning is done for the next teaching session.

It may well take several feedback cycles to register an impact. The feedback should therefore be continuous and automatic to ensure a quicker impact on the teaching-learning situation.



Formative feedback may take on different forms of which moving about the room and using a conversational approach may well be needed to strengthen the understanding of written feedback. A conversational approach fits perfectly into the mediated learning experience which was referred to previously as to be part of the Feuerstein model (*see Chapter 2, paragraph 2.6*).

The developmental nature of formative feedback is corrective by design, whereby teacher and learner can note what are completed successfully and correct, but also to note what is still lacking in order to be able to complete successfully. Any improvement, however small, should be focused on direction and encouragement to all learners no matter what level or stage of the learning cycle they are at. This further strengthens assessment as part of a mediation process to incorporate teaching-learning and assessment. Recognising the full range of achievements of all learners makes formative feedback constructive because of the motivational effect of such feedback which inspires learners to achieve their best. In such a manner, learners become self-motivated to learn even more and become better able to master the next step. In this way the learner turns into a strategic and effective learner.

Formative feedback also includes evaluation. Although either a numerical or alphabetical mark may be awarded to the work done, the reasons for awarding a particular mark should be part of the feedback which then serves as plan (guidance) for further improvement.

#### **6.4.3.3 Assessment to improve self-reflection and reflection on learning**

Where teacher and learner are working collaboratively, a metacognitive element of “*I know what I’ve learned and why*”, is vital (*see paragraph 6.3.7, Figures 6.1, 6.2 and 6.3*) for both. Teachers can promote learners’ metacognition (reviewing yourself how you learn), by guiding the learners to become more conscious of their learning skills by asking them to reflect on effectiveness, evaluate strategies, own understanding and particular skills.

For formative assessment to be productive, learners should be guided to do self-assessment so that they can understand the main purposes of their learning and thereby grasp what they need to do to achieve. To develop the ability to engage in self-reflection and for learners to be able to identify the next step in their learning, deepen the ability to seek out and gain new skills,

new knowledge and new understandings are needed. Teachers can equip learners with the desire and the capacity to take charge of their learning through developing the skill of self-assessment. Commencing with the assessment process by including an explanation and giving reasons for instance why certain tasks are important and talk about links and goals will encourage learners to get involved in self-assessment. In this sense self-reflection is encouraged by mediation and will result in willingness to engage with the assessment task. As indicated in *paragraph 6.3.7* and illustrated in *Figures 6.2 and 6.3*, a good comprehension of set criteria, the knowledge of how to apply a particular set of outcomes in answering questions and being able to value one's own work, develop learners' capacity for self-assessment so that they can become reflective and self-managing.

The researcher found in the *research project (Chapter 5, paragraphs 5.3.3.1 and 5.3.3.3)* that participants teaching younger learners made use of the “traffic-lighting”-method where learners assigned red, amber or green to a piece of work, according to the degree in which the learners did or did not understand the task or work, or to indicate where they found it to be valuable. The participants also reported that through the practice of peer assessment, learners were more likely to challenge each other's judgements of their work. This sparked further discussion and debate, which in turn enhanced the possibility of formative feedback and the improvement of planning for the next level of learning.

#### **6.4.3.3.4 Assessment to enhance classroom practice**

The Assessment Council and Alverno College Faculty (1994: 47) at the Alverno College in the USA reported that their high pass rate and success with student/learner performance are directly linked to the assumption and application of assessment to be a natural part of teaching. Alverno College identified ability as an outcome to be used in all aspects of instructional design and assessment practice. This outcome is linked to a close-to-life context, prompt feedback, provision for self-assessment and a means of evaluation which will ensure continuing improvement of teaching practice and assessment processes (1994: 28). The report portrays that the same educational principles informing their assessment practices, also inform their teaching at the college. They follow the assumption that if their students/learners are to develop and demonstrate their knowledge and understanding, the teaching needs to provide active and interactive learning. A further view with which the researcher concurs is

that for learning to be integrative and experiential, the practice needs to be as close as possible to those in which the required abilities need to be developed and applied – an important matter referred to in *Chapter 1, paragraph 1.1* and *paragraphs 6.1 and 6.2 of this chapter*.

The literature study (*Chapters 2 and 3*) as well as the empirical study (*Chapter 5*) provided evidence of an urgent need for an integration of teaching and assessment practices – evidence which the researcher used to make suggestions for a constructive instructional design and formative assessment practice as modelled in *Appendix H*. Tasks and questions which prompt learners to demonstrate their knowledge, understanding and skills in class links teaching and assessment for the purpose of learning. The teacher’s observation and interpretation of what learners say and do during tasks may also result in easier evaluation to determine the possibilities for improved learning. These actions involving both teachers and learners in reflection, dialogue and decision-making appear to be essential parts of everyday classroom practice.

#### **6.4.3.3.5 Assessment to enhance emotion and enable conducive learning conditions**

Teachers should be aware of the impact particular comments as well as marks and grades in general may have on learners' confidence and enthusiasm. Comments focusing on the work rather than the person are more constructive in motivating learners and in order for effective learning to happen.

When learners have a good understanding of what it is they are attempting to achieve, the achievement becomes quicker and easier. Understanding and commitment follows when learners are involved in determining goals and identifying criteria for assessing progress. Learners feel more comfortable in the teaching-learning situation if a teacher communicates assessment criteria in terms that they can understand or by providing examples of how the criteria can be met in practice. Grasping such assessment criteria enables learners to fare better in attempting peer- and self-assessment.

The reporting from the participants in the *research project (Chapter 5, paragraphs 5.3.3.1 and 5.3.3.3)* on their own feelings about assessment as “useful but scary”, and when not performing well they associate the following with the feeling (emotion): “inferior, sad, scared,

insecure, shaky, exhausting”. The participants described their and the learners’ feelings in instances of good performance as: “exciting, happy, encouraging, good experience, sunshine”. The words associated with the emotions reminded the researcher of the research done by Dr. Richard Lazarus, a pioneer in the study of emotion and stress, especially their relation to cognition, which he described as “the marriage between emotion and thought” in his 1991 book *Emotion and adaptation* (pp. 19-22). He was renowned for his cognitive-mediational theory within emotion which holds that cognitive activity may be conscious or unconscious and may or may not take the form of conceptual processing. This has also much to do with the suggestion that emotions (affect heuristics, feelings and gut-feeling reactions) are often used as shortcuts to process information and influence behaviour as described by Joseph Forgas (1995: 43-58) as the affect infusion model (AIM) that attempts to explain how emotion and mood interact with *one's ability to process information*.

It was evident in the empirical research from the first to the last stage of the investigation that emotion plays an immensely significant role in teaching, learning and assessment, in particular on the ability to process information and be involved in the teaching-learning situation on a particular affective domain level as described in *Chapter 3, paragraph 3.5.3*. There appears to be a connection between the receiving, responding, valuing and organising levels of the affective domain with the processing of information (data) as described by Forgas (1995: 35-66). Forgas (1995: 35-66) argues that “substantive processing”, or systematic processing involves the most elaborate cognitive processing and appears highest on the continuum, as it is the most powerfully affected by mood. Situations that require cognition about difficult, peripheral subjects or that require judgement of obscure, atypical subjects appear to be most affected by emotion (mood).

From the affective domain as described in *Chapter 3, paragraph 3.5.3*, the researcher found that *valuing* and *organising* are the levels which link with “substantive processing” and will be most affected by emotion (mood). *Valuing*, because the learner is expected to demonstrate a preference or display a high degree of certainty regarding an opinion. *Organising*, because the learner has to combine different values, information, and ideas through accommodation in his or her own schema by comparing, relating and elaborating on what has been learned.

These findings have implications for the teaching-learning and assessment practice in the approach to follow in the classroom, the atmosphere in the classroom, the choice of teaching strategies and for the teacher to be aware of the emotional impact of planning and conducting teaching and assessment on the learner.

## **6.5 LIMITATIONS OF THE STUDY**

The action research implementation was limited to the development of Stages 2 and 3 of the research design as well as the contact session programme. The research findings could not be more widely applied in more teacher training programmes in other higher institutions or in the field to see what the impact of the research findings in another applied context would be.

Although the research design included some triangulation by including the research report (*exam equivalent – Appendix G*) and involved a scribe and tutors as verifiers of interpretation of discussions in the focus group discussions, a quantitative, non-experimental design in Stage 2 of the study would have added to its credibility. A quantitative non-experimental design as add on with a survey regarding opinions and teacher beliefs pertaining to learning could have been followed by an ex post facto design to seek information on whether changes took place. Or, the ex post facto design could have been used in a comparative design to investigate the impact of the approach where applied in comparison with a context where the approach was not applied.

School visits and classroom investigation could be a further plus for similar investigations. Time frames and ethical considerations for access to the schooling system, limit the possibilities of practical classroom research.

## **6.6 RECOMMENDATIONS FOR FURTHER RESEARCH INITIATIVES**

An extended list of possible research questions which would justify further research in this area could include the classroom methods used, the motivation and experience of the teachers, or the nature of the assessment used as measure of success, or about the outlooks and expectations of the learners involved. However, whilst there is ample justification for

proceeding with carefully formulated research, the researcher is of the opinion that enough is known from existing research to provide a basis for *active developmental work*, and some of the most important questions can only be answered in a programme of practical implementation.

Basic research which could provide meaningful answers to some burning questions in quality assurance in education could be a study of the ways in which teachers understand and deal with the relationship between their formative and summative roles, which will have some practical implementation possibilities as well. A comparative study could include a main research question of the predictive validity of teachers' continuous assessments or school-based assessment tasks compared with external test results. The impact of teacher and learner motivation on performance proved to be so strong from the empirical research in this study that the researcher recommends further investigation into other spectra of the educational system as well. Research to cover the role of motivation in andragogy namely to investigate what motivates the adult learner will be of value especially for adult basic education and training initiatives. Pivotal response theory has initially dealt with motivation as a pivotal area in treating autism spectrum disorders, but an expansion of introductory research in this area will even guide teaching strategies related to inclusive education.

Even though the above may be covered by basic research and findings to be utilized for developmental programmes as proposed, substantiated and even triangulated research endeavours on the emotional impact of assessment as well as the language as bridge or barrier still require intense qualitative and quantitative investigation.

## **6.7 CONCLUDING REMARKS**

There is a need to shift from the merely informative, if learners are to achieve higher conceptual levels of understanding. Learners who have reached a higher conceptual level will not only grasp the critical factual knowledge, but also understand the generalisations and principles and can therefore apply these in new contexts. The research provides clear evidence that teaching, learning and assessment should be seen as being in a triangular relationship where planning for teaching – and assessment practices – also has to change. Changes in the skills and knowledge needed for new abilities and good performance will have

an effect on the understanding of how learners learn as well as the relationship between teaching and assessment. How teaching, learning and assessment are planned for and the way knowledge is mentally organized, makes the difference between real understanding and just reciting facts. It is therefore necessary to focus on how the organization of knowledge can be planned to be more accessible to the learner, enabling him or her to construct his or her own understanding and then provide proof of understanding in the assessment process.

A constructive teaching design to enable effective teaching and learning also challenges learners to acquire interpreting, analysing and application skills to be able to transfer and apply knowledge in new contexts. Contextual limitations, teacher abilities and learner readiness will unfortunately influence the effectiveness of such design which makes the need for intensive developmental programmes for teachers and better utilisation of classroom time imperative.

It became clear that language is the most prominent mediating tool that shapes the understanding of new concepts. The mediation of concepts happens most effectively through language, and through the interaction between learner and teacher since, in the process of negotiating a common meaning, both learner and teacher will discover how they learn, what their assumptions are and how to best find the meaning of new concepts and content.

The teacher's will and striving to plan and to teach, the learner's emotional state (mood) to take up challenging tasks and the classroom atmosphere all appear to be connected to motivation which consciously or unconsciously may inhibit or promote conceptual processing. Especially difficult, peripheral subjects or actions which require judgement, opinion, redesign and new application of knowledge and skills appear to be most affected by the presence or lack of motivation. Motivation carries the characteristic of *intentionality* which also includes the idea that motivation will encourage the learner to "move" in a particular direction. The suggestion of a constructive teaching, learning and assessment model (*Appendix H*) intends to illustrate practically the planning and assessment practice required to "move" the learner toward deeper understanding and improved performance in a supportive, conducive teaching-learning environment. In this environment, learners feel safe enough to risk making educated guesses, venturing to find new meaning and being able to deal with multi-dimensional contexts.

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## **VIDEOS**

A Visit to a motivated classroom by Association for Supervision and Curriculum Development (ASCD) <http://www.ascd.org> Alexandria, Virginia USA (0071008230)

Educating Everybody's Children: Attitudes and Beliefs by Association for Supervision and Curriculum Development (ASCD) <http://www.ascd.org> Alexandria, Virginia USA (0071008240)

Motivation- The Key to Success in Teaching and Learning *by Association for Supervision and Curriculum Development*. <http://www.ascd.org> Alexandria, Virginia USA (0071008228)

Qualities of Effective Teachers 2 – Managing the Classroom *by Association for Supervision and Curriculum Development*. <http://www.ascd.org> Alexandria, Virginia USA (0071008229)

Qualities of Effective Teachers 3 – Planning and Delivering Instruction *by Association for Supervision and Curriculum Development*. <http://www.ascd.org> Alexandria, Virginia USA (0071008238)

Voices from the Classroom: Dimensions of Good Teaching *by the School of Education, University of Pittsburgh*. Pyramid Media, Santa Monica. (0071008237)

**News paper articles, magazines and clips:**

Beeld of 15 July 2009: 2.

Beeld of 29 September 2009: 7.

Business Day of 20 Jan 2006.

Financial Mail of 8 September 2006.

Time, 29 March 1999. Vol 153, No 12: 105.

The Herald of 22 September 2005.

## **Appendix A: Participant consent form**

*Dear ACE student and willing research participant*

Your verbal consent to avail yourself to be part of the Focus Group Discussions on teaching, learning and assessment, is highly appreciated.

I gladly confirm the verbal discussions by referring to the following:

- Your participation in the research is voluntary and you will not be named neither will your comments or claims be linked to you in person. You will stay an anonymous participant in the Focus Group Discussions.
- The tutor who will lead the discussions in the group, will make final arrangements regarding venue and the time of meeting. Please meet your tutor today at 17:00 in BU240 for the final arrangements.
- Please note that your group is associated with the initial of you tutor – so please gather where you will see the alphabetic letter in the BU240:

Group 1 - B

Group 2 - H

Group 3 - M

Group 4 - S

- During the 45min – 1h15min session, your tutor will pose particular questions for discussion.
- Please sign and submit the attached form at the arrangement meeting this afternoon.

I appreciate your keen interest and participation in the discussions.

Celia Booyse

083 782 2611

011 – 717 3245

***Focus Group Discussion***

***Consent form***

I \_\_\_\_\_ herewith confirm my voluntary participation in the Focus Group Discussions on teaching, learning and assessment practices.

I understand that I may withdraw participation at any given time without providing reasons.

I understand that the discussion forms part of research on instructional design and assessment practices which will also be to the benefit of other students in the programme.

\_\_\_\_\_  
Name & Surname

\_\_\_\_\_  
Student number

\_\_\_\_\_  
Date

## **Appendix B: Tutor consent form**

Dear Tutor

Your willingness and verbal consent to lead the focus group discussions is appreciated.

I gladly confirm the verbal discussions by referring to the following arrangements:

The allocated time for each session should be between 45 min and 1h15min. There will be four groups:

Group 1 - B

Group 2 - H

Group 3 - M

Group 4 - S

Please arrange discussion time after contact sessions to meet with your particular group at 17:00 in BU240. I've requested one participant in the group to be the scribe. Please collect the notes after the session. Please inform me of the time of meeting to enable me to schedule observation time for all four groups.

Please see included in the envelope a transparency with the following questions to pose to the group.

- How do you plan and design your teaching?
- Do you make use of a particular theoretical framework in your planning? If so, explain how you would frame you planning theoretically.
- Do you see motivation as important in teaching? Give reasons for your answer.
- Do you think that teaching and assessment should be integrated entities? Give reasons for your opinion.
- What do you think influence your way of teaching and assessment?

- When and for which purposes do you assess?
- Do you feel that you assess effectively? Give reasons for your answer.

As previously mentioned, your interest in the research study which will also advantage the ACE educational programme is highly valued.

Your research colleague

Celia Booyse

083 782 2611

011 – 717 3245

## Appendix C: Open Questions

### *Reflection on teaching and assessment practice*



What do you understand by the term “Assessment”?

Do you think there is a link between teaching and assessment? Give reasons for you answer.

When and how do you plan for assessment activities at the moment?

Is planning for assessment part of your teaching?

Do you consider outcomes to be part of assessment criteria? Give reasons for your opinion.

For what purpose do you use assessment in your classroom?

*I herewith give my consent that these ideas can be used for further educational research as explained and discussed by Ms C. Booyse*

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Appendix D: Permission to access and use of data

### Wits School of Education

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27 St Andrews Road, Parktown, Johannesburg, 2193 • Private Bag 3, Wits 2050, South Africa  
Tel: +27 11 717-3007 • Fax: +27 11 717-3009 • E-mail: [enquiries@educ.wits.ac.za](mailto:enquiries@educ.wits.ac.za) • Website: [www.wits.ac.za](http://www.wits.ac.za)



10 December 2008

Cecilia Booyse  
Curriculum Division  
School of Education  
University of the Witwatersrand

Dear Celia

I approve and grant permission for you to use the data collected from the ACE flexi block release EDUC2001 and 2002 groups that was taken from the focus group discussion and research on the understanding of assessment and teaching practice and their exam equivalent.

I look forward to seeing your completed empirical study towards a D. Ed with the title: "A Constructivist approach in instructional design and assessment practice".

Yours faithfully

A handwritten signature in black ink, appearing to read "M Metcalfe".

Professor Mary Metcalfe  
Head: Wits School of Education.



**Appendix E: Classroom Assessment (EDUC2002) July 2008 contact programme**

*University of the Witwatersrand*

*Wits School of Education*

Advanced Certificates in Education,

# **Classroom Assessment**

**EDUC 2002**

**Contact Programme**

**July 2008**



*Compiled by Celia Booyse*

*Copyright 2008, Wits School of Education*

# ***Classroom Assessment - EDUC 2002***

## ***July 2008 Contact***

### Tutorial 1

Understanding the term “assessment”? (Lecture)

### Tutorial 2

Classroom Assessment - EDUC 2002 – course content

Characteristics of ‘good’ assessment tasks

### Tutorial 3

Clarifying Continuous Assessment

### Tutorial 4

Assessing higher order thinking skills and

Working with Assessment Criteria

### Tutorial 5

Assignment discussion

Intro to exam equivalent

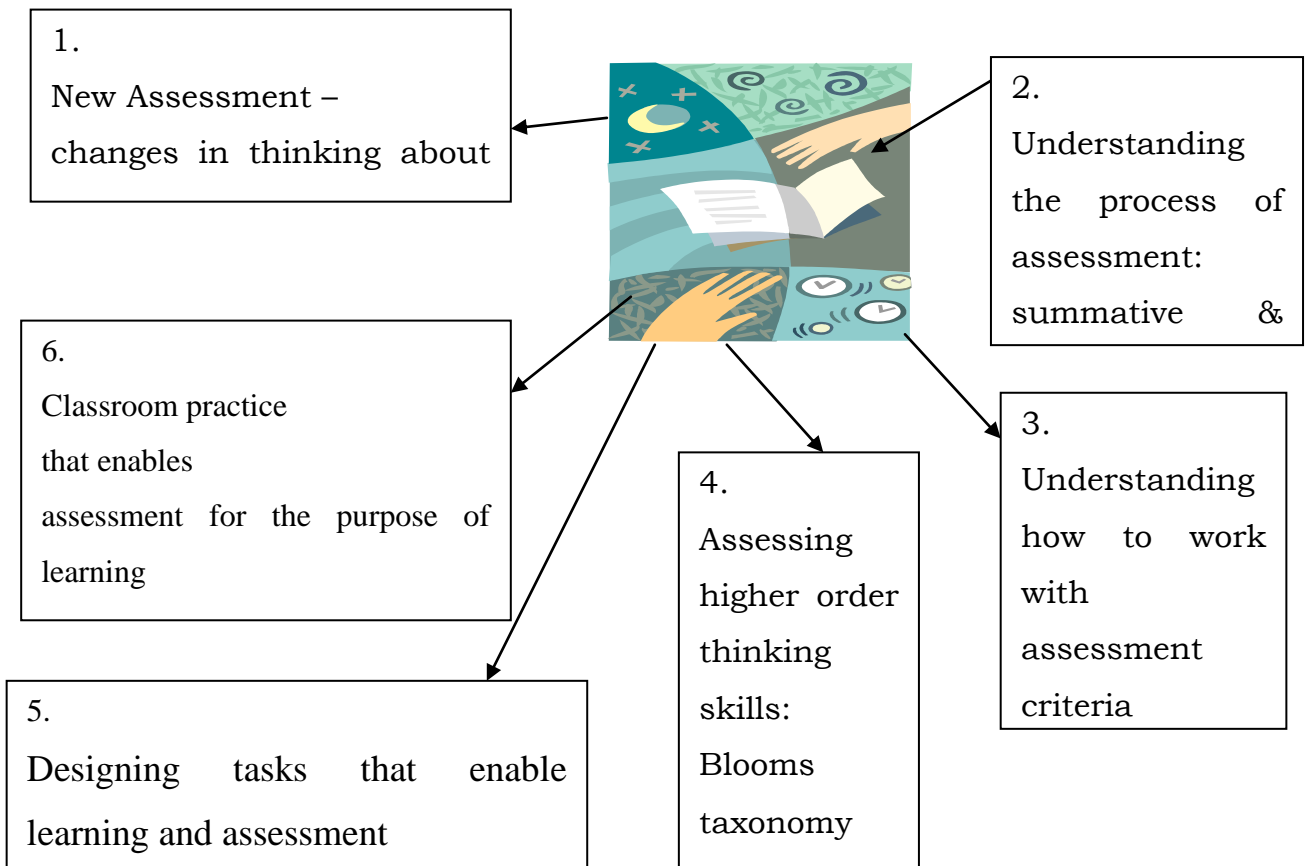
# Session 1: Understanding the term “assessment”?

## Lecture

By the end of this session you should:

- have an overview of what OBE assessment is about
- have an overview of what the module on ‘Classroom Assessment’ is about
- be familiar with the books you need when studying for this module

## Classroom Assessment





What do you understand by the term “Assessment”? (*see separate sheet with questions for open discussion in the group*)

What would you say - Do definitions matter? Is it important to define a concept? Discuss with your colleague and write down a few notes.

- We are talking about definitions of concepts, i.e. words that encapsulate a complex idea.
- Each definition comes from somebody, in a particular context and time
- Each definition takes a position – it describes what is in or not, what to focus on or not
- Definitions have consequences, they lead to different kinds of action

The world of educational policy and the academic world differ in their approach to definitions

In the academic world, we look at definitions carefully to see / find / analyse the different emphases in the definitions, and thus to recognize the positions from which they come

For example:

What are the differences?

(with regard to extent, position and consequences for action)

*Oxford Advanced Learners Dictionary:*

Assessment is a “carefully **considered opinion** or **judgement**”

*Shandamo, Matsinibi, Munro:*

Assessment is a “**systematic and objective process of** finding out how well each student has learned the instructional objectives”

Gardener: “*Assessment is the obtaining of information about the skills and potentials of individuals, with dual goals of providing useful feedback to the individuals and helpful data to the surrounding community*”

DoE Revised *National Curriculum Statement*, Grades R – 9 (Schools), 2002

- ✚ Assessment ... is a continuous, planned process of gathering information about the performance of learners measured against the Assessment Standards of the Learning Outcomes. It requires clearly-defined criteria and a variety of appropriate strategies to enable teachers to give constructive feedback to learners and to report to parents, and other interested people.

**The change in thinking about assessment:**

*Ideas from different authors about assessment regarding reasons for changes in assessment*

Assessment is changing for many reasons. Changes in the skills and knowledge needed for success, in our understanding of how students learn, and in the relationship between assessment and instruction are changing our learning goals for students and schools. Consequently, we must change our assessment strategies to tie assessment design and content to new outcomes and purposes for assessment (Bond, Herman, & Arter, 1994; Bond, Herman, & Arter, in press).

As society shifts from an industrial age, in which a person could get by with basic reading and arithmetic skills, to an information age, which requires the ability to access, interpret, analyze, and use information for making decisions, the skills and competencies needed to succeed in today's workplace are changing as well (Bond, 1992; National Center on Education and the Economy, 1989; and U.S. Department of Labor, 1991). In response to these changes, content standards - the knowledge, skills, and behaviours needed for students to achieve at high levels - are being developed at the national and state levels in areas such as mathematics, science, geography, and history. These standards have been synthesized in *The Systematic Identification and Articulation of Content Standards and Benchmarks* (Kendall & Marzano, March 1995 update).

In this atmosphere of reform, student assessment is the centerpiece of many educational improvement efforts. Policymakers hope that changes in assessment will cause teachers and schools to do things differently (Linn, 1987; Madaus, 1985). Assessment reform is viewed as a means of setting more appropriate targets for

students, focusing staff development efforts for teachers, encouraging curriculum reform, and improving instruction and instructional materials (Darling-Hammond & Wise, 1985).

Many educators and policymakers believe that what gets assessed is what gets taught and that the format of assessment influences the format of instruction (O'Day & Smith, 1993). Contrary to our understanding of how students learn, many assessments - particularly traditional multiple-choice and true-false assessments - test facts and skills in isolation, seldom requiring students to apply what they know and can do in real-life situations. Standardized tests do not match the emerging content standards, and over-reliance on this type of assessment often leads to instruction that stresses basic knowledge and skills (Corbett & Wilson, 1991; Shepard & Smith, 1988; Smith & Cohen, 1991). Rather than encouraging changes in instruction toward the engaged learning that will prepare students for the 21st century, these tests encourage instruction of less important skills and passive learning:

"The notion that learning comes about by the accretion of little bits is outmoded learning theory. Current models of learning based on cognitive psychology contend that learners gain understanding when they construct their own cognitive maps of the interconnections among concepts and facts. Thus, real learning cannot be spoon-fed, one skill at a time." (Shepard, 1989: 5-6).

Although basic skills may be important goals of education, they are often over-emphasized in an effort to raise standardized test scores. Basic skills and minimum competencies become the overarching goal of schools and teachers as accountability and minimum competency exams concentrate on these areas.

However, educators, policymakers, and parents are beginning to recognize that minimums and basics are no longer sufficient (Winking & Bond, 1995) and are calling for a closer match between the skills students learn in school and the skills they will need upon leaving school. Schools are now expected to help students develop skills and competencies in real-life, "authentic" situations, and schools are expected to graduate students who can demonstrate these abilities - often by their performance on alternative assessments rather than standardized tests.



Considering the ideas from the extract above:

**Why is it necessary to have a change in our ways of assessment?**

- Limitations of traditional assessments (Joffe)
- Paradigm shift in learning, so assessment must follow (Shepard)
- Need for increased equity in selection
- New education policy in SA

**What are the core changes in assessment?**

- norm-referenced → criterion-referenced
- changed task types → higher order skills, authentic, process
- summative → formative focus
- grading /selection -> grading / selection / accountability /support for learning

**What are some implications of changes in assessment?**

- Need a changed classroom culture of learning
- Need different kinds of assessment tasks / different methods of assessing
- Need teachers who are co-developers of assessment

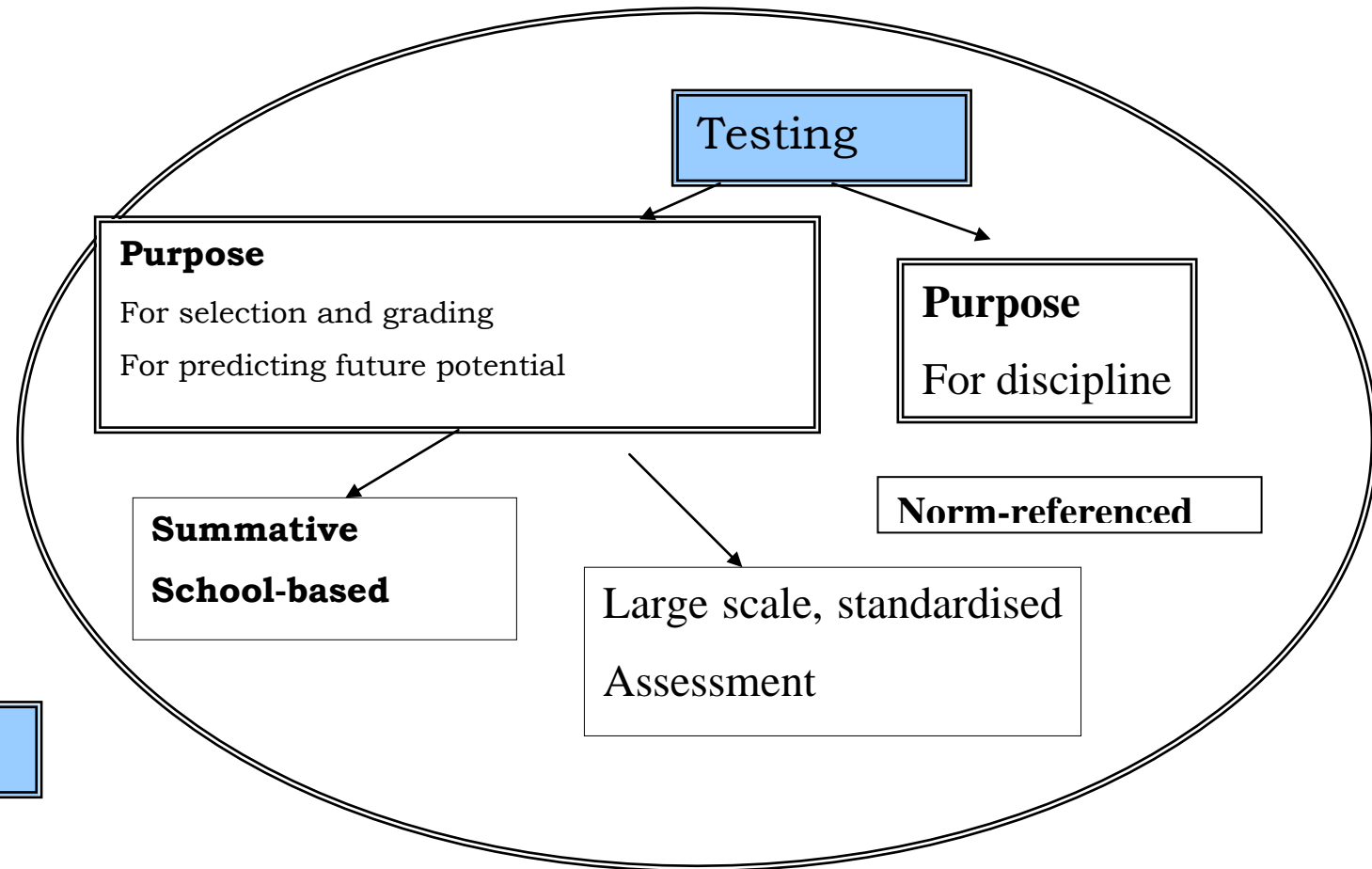
# Traditional Understanding of Assessment: Assessment of Learning

## Critiques of the traditional understanding

Often seen as 'unfair'

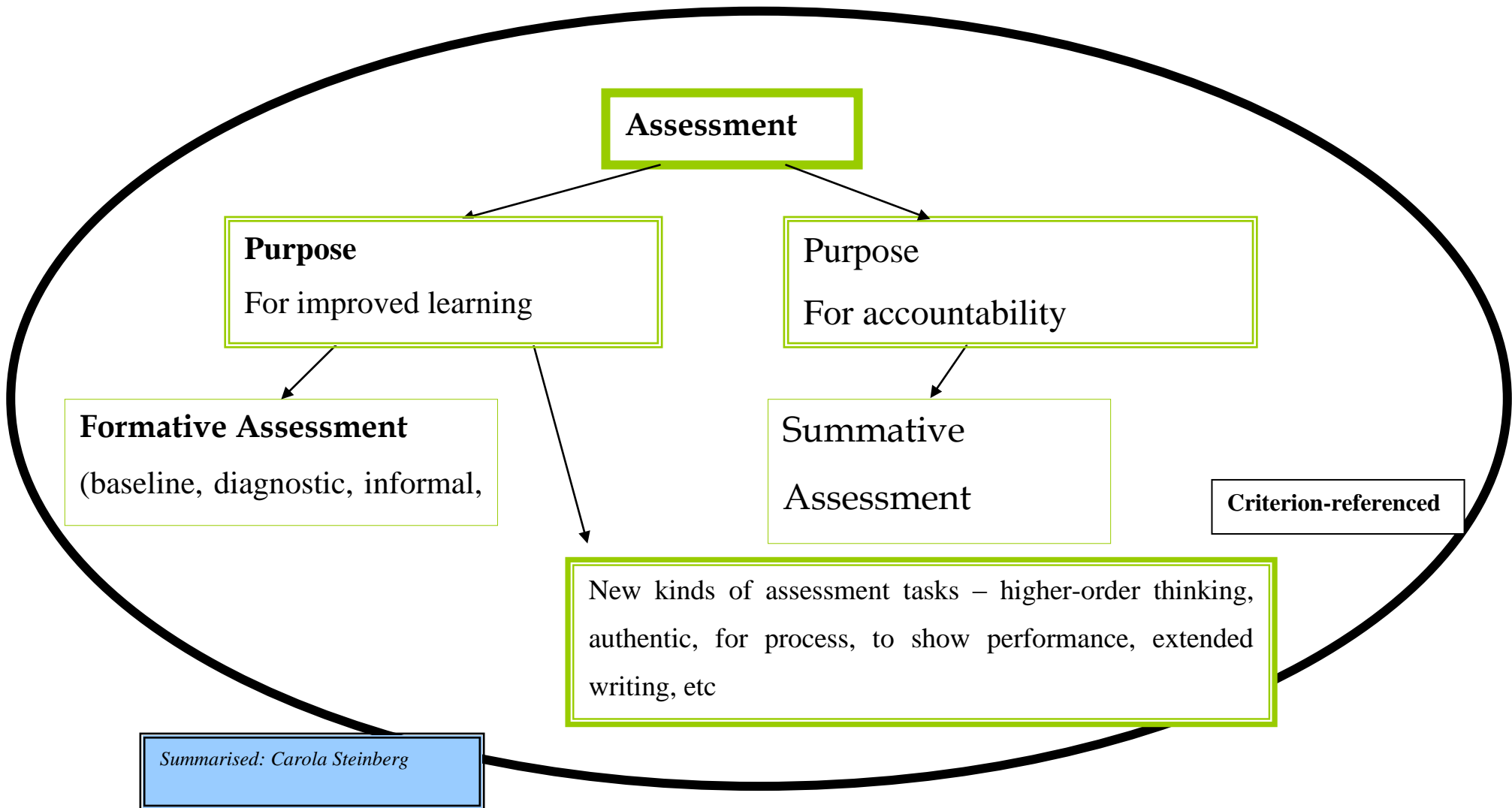
Research shows it's fine for well-achieving learners, but detrimental to low achieving learners, regarding motivation and self-esteem

*Summarised: Carola Steinberg*

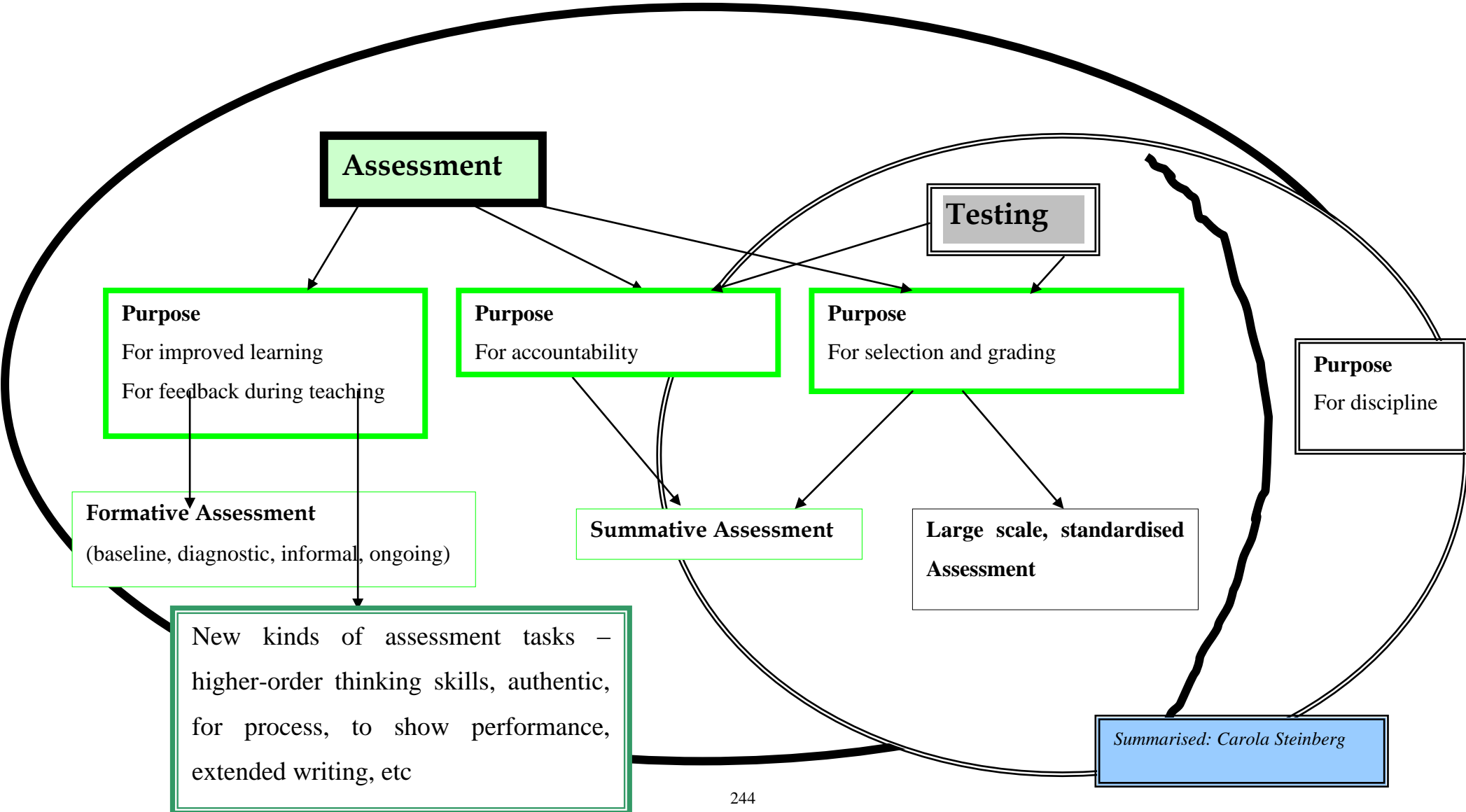




New Understanding of Assessment:  
Assessment for Learning



# OBE Continuous Assessment



## Session 2

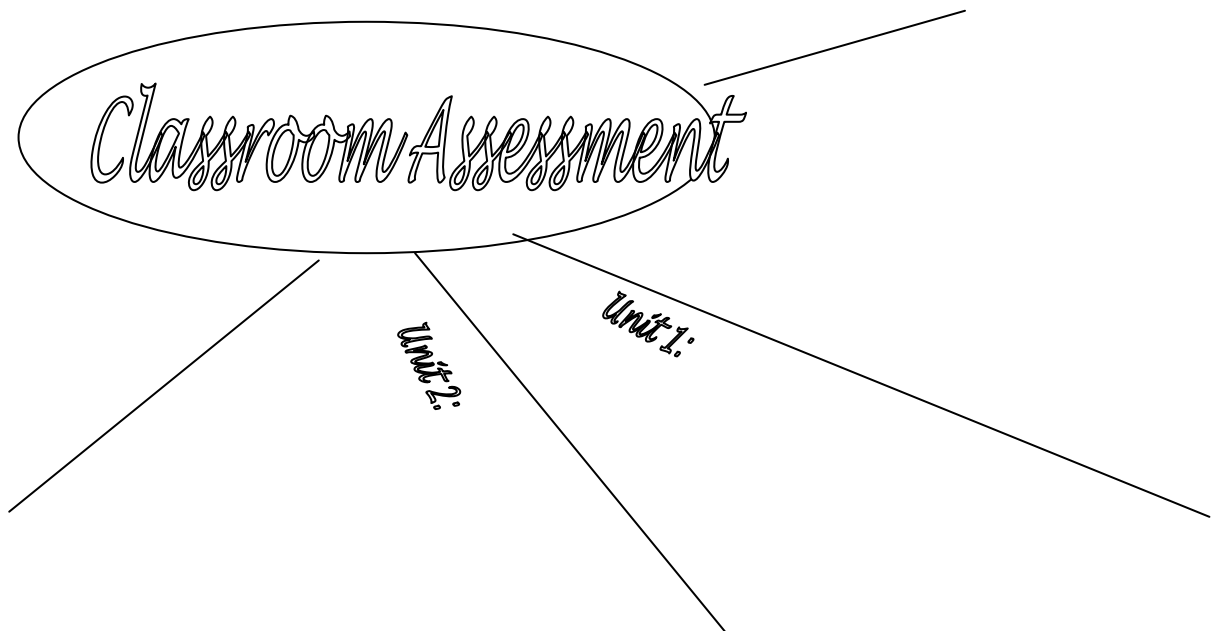
### Classroom Assessment

#### EDUC 2002 – course content

(as set by Carola Steinberg)

#### Activity 1

1. Find the contents pages in the Learning Guide and complete this mind map.



2. Find the outcomes for the module. How many are there? \_\_\_\_\_

Do you understand what they mean?

Yes       No

3. Page through Unit 1. List the 5 sections in Unit 1 and the pages on which they start.

1 \_\_\_\_\_ page

2 \_\_\_\_\_ page

3 \_\_\_\_\_ page

4 \_\_\_\_\_ page

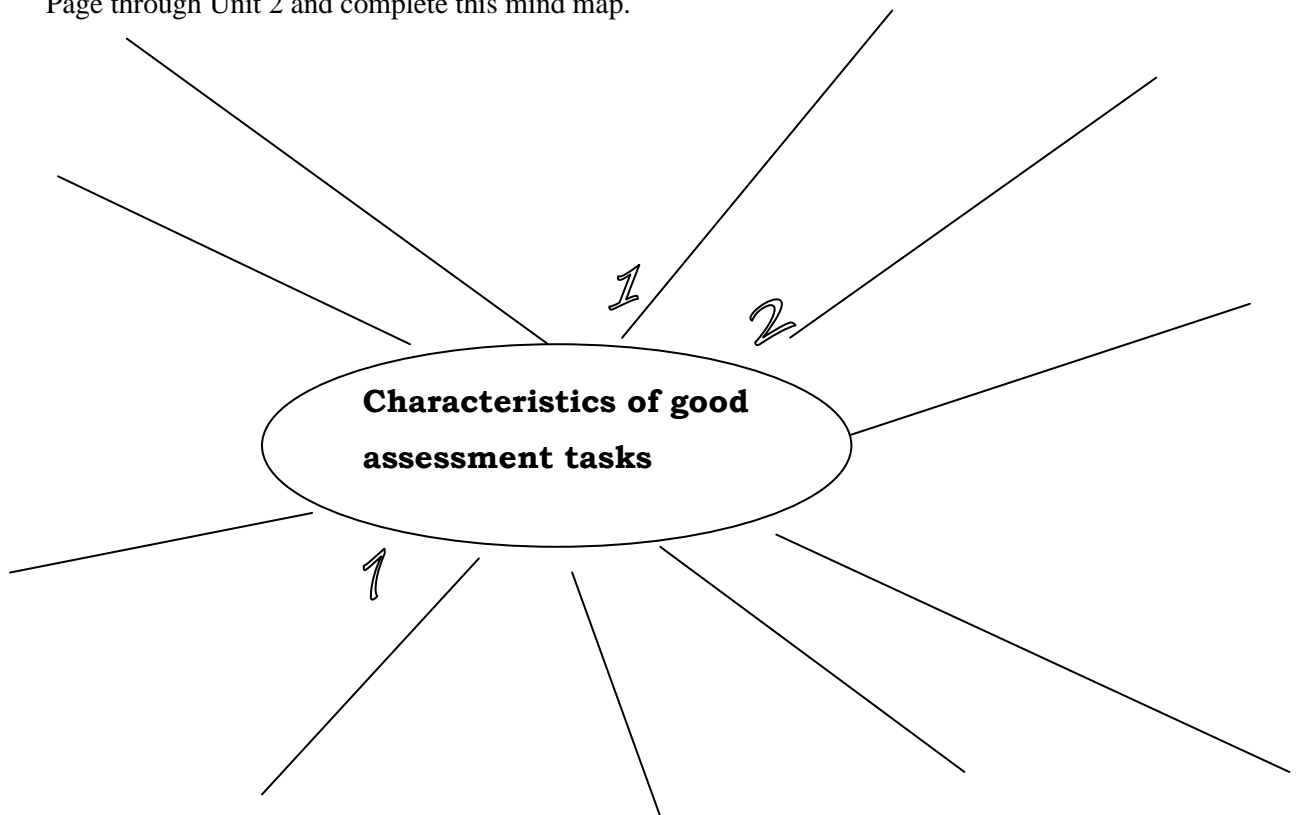
5 \_\_\_\_\_ page

4. Which section looks the most interesting to you, and why?

---

---

5. Page through Unit 2 and complete this mind map.



6. Which of these characteristics of good assessment tasks do you achieve already? Which are you pleased to be learning about?

---

---

---

---

7. Page through Unit 3 and fill the section headings into this table.

1		4	
2	Paul Black : The Nature and Value of Formative Assessment	5	
3		6	
		7	

8. Which of these topics do you already know a lot about?

---

---

9. Look at the Reader. How many articles does it have? \_\_\_\_\_

10. Who wrote the article *An Experiment in Peer Assessment* and what is her job?

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11. Which article do you think you will find the most interesting and why?

---

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12. What is your overall impression of this module?

---

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## Activity 2: Characteristics of ‘good’ assessment tasks

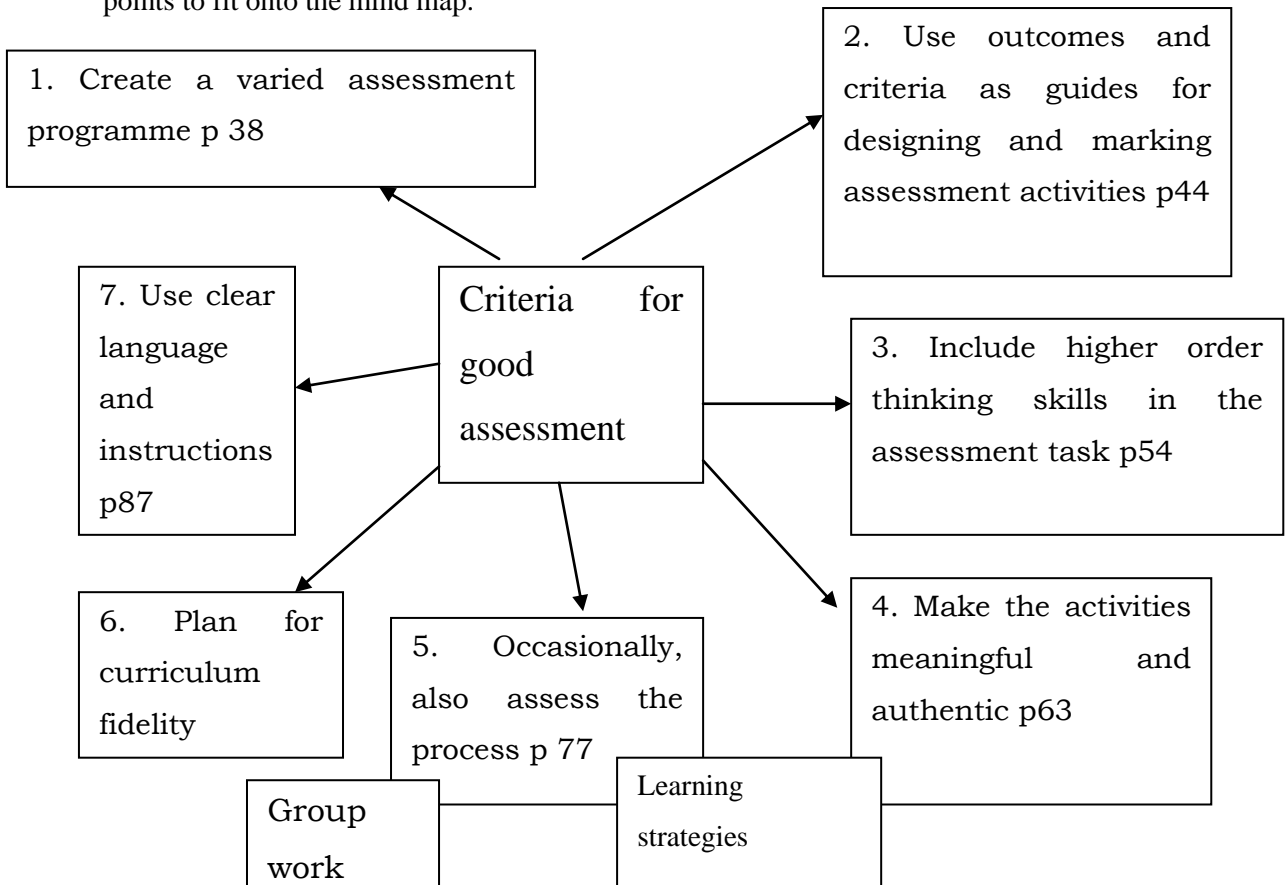
### Outcomes

By the end of the session, you should be better able to:

- Have an overview of what is involved in producing ‘good’ assessment tasks for your learners
- Analyse the qualities that good assessment tasks have

Summarise the characteristics of good assessment tasks, as presented by Unit 2 of the Learning Guide, p 37

- a) Work in pairs / small groups. Each pair is allocated one of the sections of the mind map below. Re-read the relevant section in the book and write short summary notes of the main points to fit onto the mind map.



- b) Report back from some of the pairs or small groups, leading to a whole group mind map on the board that summarises each characteristic:
- Why is it important?
  - What are the key features?
  - What do you need to watch out for when implementing?
  - Any new insights?

### Analyse an assessment task (if time permits)

- a) Work through unit 2, section 3.1 and do activity 21.
- b) Analyse the following tasks against the criteria for good tasks that you have just summarized.
- ✚ Science tasks: Analyse the science tasks on pp. 65-68, p89-90 and pp. 96 – 97.
  - ✚ Maths tasks: Analyse the maths tasks on pp. 69-73 and pp. 94-95
  - ✚ Language tasks: Analyse the language tasks on pp. 56-58, pp. 59-62, pp. 125-130.

Report your insights to the whole class and discuss.



### Activity 4: *Homework*

Read the following 4 passages on continuous assessment before you come to class tomorrow. During and after reading, write your questions about continuous assessment.

- i) Learning Guide: Unit 1, section 2.3, pp. 10-18
- ii) Reader: Cliff Malcolm: *Thoughts from SA: That's not Assessment, that's Teaching* in the Reader, p. 60 using the LG, p.108, Activity 41, to help you with your thinking
- iii) Learning Guide: Unit 3, section 1, pp. 107 - 111

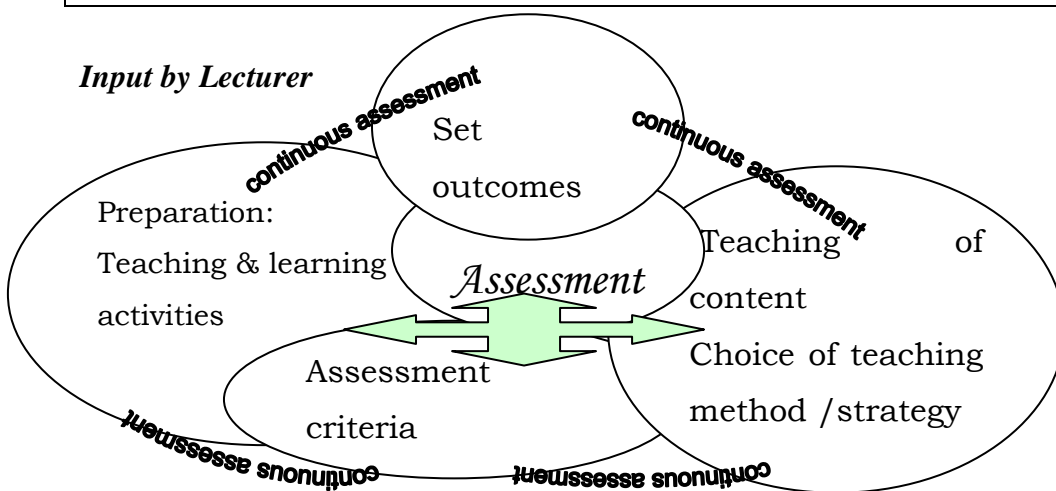


## Session 3: Clarifying Continuous Assessment

### Outcomes

By the end of this session you should be better able to:

- describe different ways of understanding continuous assessment
- clarify the relationship between teaching and assessment
- read an article looking for the argument



### Characteristics of continuous assessment:

- *Continuous assessment means that you assess your learners at each critical step of their learning.*
- *Continuous assessment is about recording your observations of your learners' progress and using this information to see how the learners learn and to guide you on how you should teach your next lesson. All assessment, even examinations, should be designed to form a part of active learning, and not be treated as a separate activity.*
- *Continuous, formative assessment takes place on and off throughout a course or period of learning in order to monitor the learners' progress and inform teaching and learning.*
- *In continuous assessment the educator is constantly aware of how the learners are developing, and keeping a record of this development. Evidence of competence (when a learner achieves outcomes) often emerges during normal daily class work or from*

*homework. The educator may observe that a learner has met the criteria for achieving a particular outcome by:*

- ❖ *watching the learner working in a group*
- ❖ *listening to the learner explaining a concept*
- ❖ *reading the learner's evaluation of a model, or drawing, or graph*
- ❖ *assessing any other activity used to teach the learners*

### Activity 1: Read four texts and discuss continuous assessment

- i) Learning Guide: Unit 1, section 2.3
  - ii) Reader: Cliff Malcolm: *Thoughts from SA: That's not Assessment, that's Teaching* in the Reader, using the LG, p108, activity 41, to help you with your thinking
  - iii) Learning Guide: Unit 3, section 1, p 107-111
  - iv) Khethinkosi Nthuli's article: "Teaching versus Continuous Assessment". (*See article, p7*)
- 
- a) Present the insights (and confusions) that you gained from the 4 readings on continuous assessment.
  - b) Discuss your understanding continuous assessment as a class. Clarify misconceptions and see if you can generate a mind map to give an overview of the issues. You do not need to come to complete agreement, just use the discussion to clarify different ways of understanding what continuous assessment is about.
  - c) If there is time, do some dialogue writing on the topic of continuous assessment. Each person starts with a question, passes it on to someone who answers it until they come to a new question, and then the paper is passed on again.

LG, pp. 10-18	Cliff Malcolm, Rp. 60	LG, pp. 107 - 111	Nthuli

## Session 4

### Assessing higher order thinking skills

and

### Working with Assessment Criteria

#### **Outcomes**

By the end of this session you should be able to:

- Distinguish between higher and lower order thinking skills;
- Analyse questions to check what kind of thinking skills the answers demand
- Compare assessment tasks, identifying lower and higher order thinking skills.
- understand the value of assessment criteria
- use and evaluate given assessment criteria.

#### Activity 1: What are higher order thinking skills?

- a) Whole group brain storm: What are higher-order thinking skills?
- b) Read the introduction and Bloom's taxonomy of thinking skills on page 54 of the Learning Guide.  
Make sure you understand the meanings of the words and the ideas. Ask your lecturer to clear up any confusions. Ensure that you understand clearly what the difference is between lower- and higher-order cognitive skills.
- c) Choose a topic and formulate at least 4 to 6 questions on the topic. Underline the "trigger words" in each of the questions. Classify the questions by using Bloom's Taxonomy. Did you formulate any higher-order questions? If not, formulate at least two higher-order questions on the same topic.

- d) In the taxonomy, look at the ‘products’, or the examples of tasks through which learners can practice and demonstrate their thinking skills. Do you use any of these kinds of tasks in your teaching?

### Activity 2:

Learning Guide p. 58 – Activity 21

### Activity 3: Compare two assessment tasks

- a) Work through unit 2, section 3.2 and do activity 22.
- b) Report your insights to the whole class and discuss.

### Activity 4: Generate a working definition of assessment criteria

- a) Brainstorm: How do you decide whether a learner’s work is good or not? In other words, on what do you base your judgement?
- b) Read p. 44 (unit 2, section 2) in the Learning Guide and work in groups to do activity 16.
- c) Report your insights to the whole class and discuss your understandings.

### Activity 5: Analyse different versions of assessment criteria

- a) Work through Unit 2, section 2.2 of the Learning Guide (p. 50) and do Activity 19.
- b) Report your insights to the whole class and discuss.

### Activity 6: Application

- a) Work with a student who teaches at the same level and in the same learning area as you. Brainstorm ways in which you can apply what you learned today about higher order cognitive skills to the assessment tasks that you design.
- b) Report your insights to the whole class and discuss.

## Session 5

### Assignment discussion

#### Intro to exam equivalent

#### *See Information about Assessment Booklet*

*p. 7 - Assignment 1: Posting Date: 26 July 2008*

*p. 10 - Assignment 2 Posting Date: 6 September 2008*

Brain storm, interpret and discuss the assignment tasks first as a whole group and do the detail discussion in your small groups.

*Some ideas for interpretation to consider:*

Plan your essay in response to this question. You can use these techniques:

- Analyse the question. What are all the aspects that are contained in it? Draw a mind map that contains all the aspects.
- Page through the Learning Guide, the Reader, your lecture notes, portfolio activities etc. and mark all the sections that are related to the answer.
- Imagine yourself trying to explain to a colleague what you have learned about the topic, or an aspect of the topic, from the course materials and the discussions you have had this year. Bring in the different theories, concepts, arguments, examples and relationships that are presented in the course materials. Think about your own opinion and classroom experience on the topic.
- Develop a mind-map to put it all together into an argument that you want to present. Elaborate the mind map that you started doing on the different aspects of the question. Add more aspects. Then write 3 or 4 main points under each aspect. If you want, you can also write sub-points or examples under each main point. Then write other ideas that should be included on the page around the mind map. In this way, you have summarised all the main points that go into the

essay on one page, which allows you to look at all of it at once. That gives you an overview and helps you to see new connections.

- By now your mind map probably quite full. Draw a new version, rearranging the knowledge as it makes sense to you. This process of rearranging is useful for re-thinking about which ideas fit together.
- Transfer the mind map into headings and sub-headings for an essay, in such a way that the headings give you the outlines of an argument. This helps you to plan the structure of your essay.
- Use any other techniques of planning that make sense to you.

We hope that this planning exercise has given you a way to approach the planning of any essay in future.

## Activity 2: Introduction to exam equivalent

*See also LG, Unit 3 – Formative assessment p. 107*

*Reader, pp. 64, 81 & 90*

Read through the exam equivalent, discuss it and make sure that you understand what you need to do.

This classroom research project thus has three requirements:

Section A: You need to **investigate the way you do formative assessment** work in your classroom by following steps 1-5 and show us evidence of what you have done. You further have to show how you used a constructive approach in your planning and in the conducting of the formative assessment process.

Section B:	You need to write <b>a descriptive report of 2 pages</b> , in which you describe the context, how you planned, what you did and how the students responded.
Section C:	You need to write <b>a reflective, analytical report of 6 -7 pages</b> , in which you reflect on each of the steps, justifying what you did, analysing the students' responses and evaluating the quality of what you did, in relation to the knowledge you gained from the course materials.

<b>Outcome</b>	<b>Maximum</b>	<b>Self-assessment</b>	<b>Final assessment</b>
1 – complete research project	5		
2 – formative assessment task	10		
3 – assess and provide feedback	15		
4 – describe implementation	20		
5 – reflection on assessment	30		
6 – write coherently	20		

*Please note: Remember that we will further this discussion on the exam equivalent in September 2009. This session is only to introduce you to the exam equivalent and give you the opportunity to start early on the project, especially those of you teaching Gr 11 and 12 groups.*

*Come with questions, your tasks, way you gave feedback etc to the September session. We will assist you then in writing the reports as well.*



**Appendix F: September 2008 Contact session Classroom Assessment - EDUC  
2002**

*University of the Witwatersrand*

*Wits School of Education*

Advanced Certificates in Education, September 2008

September 2008 Contact session  
Classroom Assessment -  
EDUC 2002



*Compiled by Celia Booyse*

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## **Classroom Assessment - EDUC 2002**

Monday 29<sup>th</sup> September 11h00 – 13h00 & 14h00 – 16h30

Session 1 & 2: Feedback on Assignment 1 and discussion of Exam Equivalent

Tuesday 30<sup>th</sup> September 8h30 – 10h30

Session 3: Value of assessment: assess to learn

Tuesday 30<sup>th</sup> September 11h00 – 13h00

Session 4: Investigating marking and feedback

Tuesday 30<sup>th</sup> September 14h00 – 16h30

Session 5: Formative Assessment

Wednesday, 1<sup>st</sup> October 8h30 – 10h30

Session 6: Elaborating on the prompts for formative feedback

Assessment is derived from “*assidere*” to sit with or beside. It is something we do with and for a student, not something we do to them.

*(Wiggins, cited in Green, 1998)*

## Session 1 & 2: Feedback on Assignment 1 and discussion of Exam Equivalent

Assignment 1 feedback – *see feedback sheet for discussion*

Exam Equivalent task

Conducting and researching constructive, formative assessment

*Task: You have to conduct a classroom research project in which you demonstrate that you can **plan, prepare for** and **conduct** formative assessment in a constructive way. Furthermore you have to evaluate the work of the learners work and give feedback, where after you reflect on the process and value of the assessment.*



*We need to see that you can do constructive planning and be a competent and reflective assessor in your classroom.*

This classroom research project thus has three requirements:

Section A: You need to conduct a classroom research project. You have to demonstrate how you plan, prepare and conduct **formative assessment** work in your classroom. Follow steps 1-5 and show us evidence of what you have done. You further have to show how you applied a constructivist approach in your planning and in the conducting of the formative assessment process.

Section B: You need to write **a descriptive report of 2 pages**, in which you describe the context, how you planned, what you did and how the students responded.

Section C: You need to write **a reflective, analytical report of 6 -7 pages**, in which you reflect on each of the steps, justifying what you did, analysing the students' responses and evaluating the quality of what you did, in relation to the knowledge you gained from the course materials.

*Further references: LG, Unit 3 – Formative assessment p 107  
Reader, p 64, 81 & 90*

## Discussion:

### Section A: Conduct a classroom research project

1. Work in small groups. Write down which concepts you have to cover in the research project. Share your understanding of these concepts with your group.
2. Underline all “actions” that you have to take to conduct this research project.
3. List these “verbs / actions” which you have to take on a separate sheet and make associations with what you did up till know for the research project. Also write down what you still have to do. Work through the exam equivalent to find all guidelines of what you have to do.

### Section B: Descriptive report (2 pages)

1. Work in your small groups and share later with whole group. Discuss your understanding of a “descriptive report” with your group.
2. What will you include as part of the background description of your research project? Write down some ideas and compare with the rest of your group.
3. Page through the exam equivalent. Identify and write down what evidence you have to include as part of the descriptive report.

### Section C: Reflective, analytical report (6 -7 pages)

1. Work in your small groups and share later with whole group. Describe your understanding of “reflection”.
2. What do you have to do to “analyse” a piece of work.
3. Which articles/ views/ information from the course material do you think can you use as justification of your statements?
4. Read the following from the exam equivalent, p5 again and share your understanding of what do you have to include in your report with your small group:



*“Explain your thinking at each step, drawing on the course readings. Justify the choices you made. Critically reflect on whether the assessment task and process were fair, valid and reliable. Show how your task met the requirements of good assessment. Explain in what*

*ways this assessment was formative, using Black's categories of questioning, feedback through marking, self and peer assessment and the formative use of summative tasks. Analyse the learners' work and think about why they are answering in the ways that they are. Think about what their misunderstandings were, how you might change your teaching in response to what you have seen in their writing, i.e. how you could use this assessment formatively. Analyse the feedback the learners gave you. Present the insights you gained by evaluating what went well, what could be improved for next time and what you have learned about assessment from doing this exam equivalent.*

*Make extensive use of the course materials to justify why you conducted the assessment in the way that you did and for helping you to reflect on what happened, so that you can work with both theory and practice to gain real insights. It is essential that you integrate the concepts, examples and information gained from the readings in the course with the practice of what you have done in your classroom. Providing evidence of having learned from the course is essential for passing this reflective review of assessment. When using the exact words from the course, remember to put in quotation marks and acknowledge the source by referencing it properly. “*

## Session 3: Value of assessment: assess to learn

### Outcomes

By the end of this session you should be better able to:

- Talk about the complexities of making judgements in assessment
- Understand the need for evidence and reasoned judgement in assessment decisions.

### Input by lecturer

- *Definitions of assessment and the place of assessment in the learning cycle*
- *A change in attitude towards assessment*

*Where the most common assessment purposes are to grade, sort, to promote, select or mere evaluate, a **change in attitude towards assessment would promote the following:***

- *Assess to diagnose*

*Outcomes-based assessment want to promote assessment to diagnose because this enables the teacher to adjust teaching to suit where the learners are and to plan how to teach and assess further and get answer to the questions:*

- *Why are you assessing?*
- *What are you assessing?*
- *And how will you assess?*

A variety of tasks to find out where the learners are struggling, helps the teacher to change the teaching strategy to make teaching and learning more effective.

- *Assess for guidance and motivation*

*Motivation is like a fire; unless you add fuel, it goes out.* By Jeff Keller, President  
*Attitude Is Everything, Inc.*

Teachers want their learners to do well! By giving positive reinforcement, teachers can use assessment to create a stimulating environment that encourages learners to learn, while guiding their progress. This is possible when learners are given credit for what they can do, rather than being penalised for what they didn't master yet. In such

a manner, learners become self-motivated to learn even more and better and to be able to master the next step.

*Perhaps the most difficult task or challenge that faces educators today is to assess learners in such a way that they will feel motivated to learn. Educators are also faced with a challenge of finding ways of employing a variety of strategies-based approach in the instruction and teaching of different skills to enable learners to become strategic and effective learners.*

- *Assess for learning*

Assessment for learning underlines the entire approach of the Curriculum 2005 Assessment Policy Document. Traditionally teaching, learning and assessment have been kept separate from each other, but assessment for learning involves integrating teaching, learning and assessment. In class this means using tests as a basis for further learning, or to do informal assessment during group work or while the learners are busy with a project.

- *Assessing “learning how to learn”*

The ability to learn is in itself a competence! Usually learners don't think much about their learning strategies. Teachers can promote learners' meta-cognition (*reviewing yourself how you learn*), by helping them become more conscious of their learning skills by asking them to reflect on effectiveness, evaluate strategies and develop particular skills. The teacher can furthermore explain to learners why they have to do certain tasks and talk about links and goals.

It is quite difficult to separate learning skills from the tasks and the things they being learned – but it's useful. For example to stand outside the reading process and thinking about strategies not only improves skills in reading, it also helps understand the content.

- *Assessment for learning should be part of effective planning of teaching and learning*

A teacher's planning should provide opportunities for both learner and teacher to obtain and use information about progress towards learning goals. It also has to be flexible to respond to initial and emerging ideas and skills. Planning should include strategies to ensure that learners understand the goals they are pursuing and the criteria that will be applied in assessing their

work. How learners will receive feedback, how they will take part in assessing their learning and how they will be helped to make further progress should also be planned.

- *Assessment for learning should focus on how students learn*

The process of learning has to be in the minds of both learner and teacher when assessment is planned and when the evidence is interpreted. Learners should become as aware of the 'how' of their learning as they are of the 'what'.

- *Assessment for learning should be recognised as central to classroom practice*

Much of what teachers and learners do in classrooms can be described as assessment. That is, tasks and questions prompt learners to demonstrate their knowledge, understanding and skills. What learners say and do is then observed and interpreted, and judgements are made about how learning can be improved. These assessment processes are an essential part of everyday classroom practice and involve both teachers and learners in reflection, dialogue and decision making.

- *Assessment for learning should be regarded as a key professional skill for teachers*

Teachers require the professional knowledge and skills to: plan for assessment; observe learning; analyse and interpret evidence of learning; give feedback to learners and support learners in self-assessment. Teachers should be supported in developing these skills through initial and continuing professional development.

- *Assessment for learning should be sensitive and constructive because any assessment has an emotional impact*

Teachers should be aware of the impact that comments, marks and grades can have on learners' confidence and enthusiasm and should be as constructive as possible in the feedback that they give. Comments that focus on the work rather than the person are more constructive for both learning and motivation.

- *Assessment for learning should take account of the importance of learner motivation*

Assessment that encourages learning fosters motivation by emphasising progress and achievement rather than failure. Comparison with others who have been more successful is unlikely to motivate learners. It can also lead to their withdrawing from the learning process in areas where they have been made to feel they are 'no good'. Motivation can be preserved



and enhanced by assessment methods which protect the learner's autonomy, provide some choice and constructive feedback, and create opportunity for self-direction.

- *Assessment for learning should promote commitment to learning goals and a shared understanding of the criteria by which they are assessed*

For effective learning to take place learners need to understand what it is they are trying to achieve - and want to achieve it. Understanding and commitment follows when learners have some part in deciding goals and identifying criteria for assessing progress. Communicating assessment criteria involves discussing them with learners using terms that they can understand, providing examples of how the criteria can be met in practice and engaging learners in peer and self-assessment.

- *Learners should receive constructive guidance about how to improve*

Learners need information and guidance in order to plan the next steps in their learning.

Teachers should:

- pinpoint the learner's strengths and advise on how to develop them
- be clear and constructive about any weaknesses and how they might be addressed
- provide opportunities for learners to improve upon their work.

Assessment for learning develops learners' capacity for self-assessment so that they can become reflective and self-managing. Independent learners have the ability to seek out and gain new skills, new knowledge and new understandings. They are able to engage in self-reflection and to identify the next steps in their learning. Teachers should equip learners with the desire and the capacity to take charge of their learning through developing the skills of self-assessment.

- *Assessment for learning should recognise the full range of achievements of all learners*

Assessment for learning should be used to enhance all learners' opportunities to learn in all areas of educational activity. It should enable all learners to achieve their best and to have their efforts recognised.

.....

## Activity 1: Reflect on the value of Assessment

a) Share your ideas about the following with your group members:

- ✚ I feel positive / negative about assessment because \_\_\_\_\_
- ✚ Assessment has been useful in my life when \_\_\_\_\_
- ✚ I don't understand \_\_\_\_\_ this aspects regarding assessment because \_\_\_\_\_
- ✚ I felt victimised by assessment when \_\_\_\_\_
- ✚ What irritates me about the administration of assessment is \_\_\_\_\_
- ✚ Assessment is necessary in the school system because \_\_\_\_\_
- ✚ If I could change one thing in the assessment system, I would \_\_\_\_\_

b) Tell your answers to the whole class and create a joint understanding of both the values and the limitations of assessment.

## Activity 2: Making judgements in assessment

Discuss the responsibility of making a judgement in assessment.

For example:

- Should you lower the standard of the criteria, if more than half of the class has failed?
- Should the work of a child who has been sick for half the term be marked more leniently?
- Should you fail a child that is not coping with the work, even though you know the parents are too poor to pay the school fees for an extra year?
- Think of and discuss more examples of dilemmas from your own classroom.

## Session 4: Investigating feedback

### Outcomes

By the end of this session you should be able to:

- Explain the place of feedback in assessment practices
- Give an explanation of what formative feedback is
- Discuss the advantages of formative feedback for learner performance

### Activity 1: The question about feedback

- a. Discuss the following in your small group:
  - ✚ What do you think is the place of feedback in assessment?
  - ✚ Do you give any feedback when marking assignments, tests and/or projects?  
What kind of feedback do you give to learners?
  - ✚ Do you think that there will be a difference in giving verbal and written feedback? Give reasons for your answer.
  - ✚ What do you see as “effective feedback”? Share examples with your group.
- b. Share the small group discussion with the whole class.

### Activity 2: Discuss approaches to making judgements

- a. Discuss in the whole class:
  - What criteria do you use to make assessment judgements?
  - Is the problem of assessment judgements solved by having clear criteria for assessment? In what ways yes and in what ways not?
  - Do you think you can use criteria to make your assessment judgements fair? ***Give reasons for your answer.***
- b. Read through the article by Allan Cooper about formative feedback on the next page (p.11)
  - ✚ According to Cooper which three categories of feedback can be identified?
  - ✚ Which of these do you think will benefit the learners most? Why would you say that?
  - ✚ Do you agree with Cooper about the characteristics of feedback? Refer to the article in giving reasons for your answer.
  - ✚ Cooper refers to feedback as part of the assessment process. Do you agree? Why?

*Alan Cooper makes a case for  
effective feedback*

*(Abstract from Curriculum*

*Issue Vol 9 Iss2*



Teacher feedback to students is a crucial process in successful teaching and learning. Robert Marzano states that feedback can add up to 29 percentile point difference in student learning.

Feedback can be placed into three categories. First, there is developmental feedback: this is written or verbal explanation given as part of the developmental process of teaching and learning. Second is evaluative feedback often associated with assessment: this is grading in the form of either a numerical or alphabetical mark.

Finally, there is a combination of the two.

Development feedback is by far the most effective, because it is then an important and influential part of the teaching and learning process. It is corrective by design, noting what the students is doing that is correct and what is not correct. In this, the process is the key to success.

Any improvement, however small, not just excellence, should be focused on so that there is direction and encouragement to all students no matter what level or stage of the learning cycle they are at. The struggling student may well get the most from this form of reinforcement, but everyone wants reassurance – even the highflyers.

Whether to indicate what is not correct, or what is correct, feedback needs to be specific, immediate and personal. Specificity of feedback is a must do. Fluffy or woolly comment, phony praise or insincere comment is a big no, no. Teacher integrity is at stake and students are quick to spot this. We expect our students to practice precision and

accuracy in their work. Feedback is a great opportunity for teachers to model this. Never undervalue the power of teacher modelling.

It may well take several feedback cycles to register an impact. Therefore it must be continuous and automatic – an integral part of the class and school culture. To do this regularly, moving about the room and using a conversational approach, may well be needed. An informal method of recording will ensure that all students are included over time.

The use of a rubric will help specificity. By displaying the required learning, a clear standard or benchmark is provided against which the teacher is able to let the student know how close they are to mastering the required learning. A rubric also allows the teacher to show the students what needs to happen to keep moving toward mastery. Overarching all this is the main role of the teacher – to give guidance to the students on how to make further improvement.

Feedback when expectations are not being met also calls for a positive approach. First is to focus the students on what the goal of the learning is. This ensures there is a clearly-defined purpose.

Second, identify the responsibility of the student in order that they clearly understand what is required of them.

Third, communicate the specific component of the major step(s) needed so they can appreciate the practical purpose of the exercise.

Fourth, develop a plan that states clearly what action is needed to remedy the situation. This will be most effective if the student is required to think this out even if he/she needs the teaching prompting. Finally, arrange for further feedback.

Feedback of this nature is metacognitive with the teacher and learner working together- almost as colleagues, clearly focusing on the process. There is an attempt to grade and verbal comments about how smart or how clever the student is must be avoided at all costs.

Evaluative feedback, whether in a written form such as “well done” or in numerical / alphabetical grades such as C or 90%, has little effect on learning and even can have a negative impact on the student’s learning.

Therefore the mastery of learning process will require developmental feedback to make learning effective.....

## Session 5: Formative Assessment

### Outcomes

By the end of this session, you should be better able to:

- read, understand and present a text
- describe and define formative assessment
- understand different aspects of formative assessment

*The intention of Tutorials 4 and 5 is for you to gain a new perspective on the integration of teaching and assessment.*

### Activity 1: Reflect on a definition of formative assessment

- a. What is your definition of formative assessment? Discuss in your small group what you understand by the term “*formative feedback*”.
- b. Which of the following would you identify as formative feedback. Discuss in you small groups and provide reasons for your answers.

### Feedback Types

Feedback type	Description
Verification	Also called <i>knowledge of results</i> (KR), or <i>knowledge of outcome</i> , it informs the learner about the correctness of her response(s), such as right/wrong or overall percentage correct.
Correct response	Also known as <i>knowledge of correct response</i> - it informs the learner of the correct answer to a specific problem with no additional information.

Try-again	Also known as <i>repeat-until-correct</i> feedback, it informs the learner about an incorrect response and allows the learner one or more attempts to answer the question.
Error-flagging	Also known as <i>location of mistakes</i> (LM), error-flagging highlights errors in a solution, without giving correct answer.
Elaborated	A general term, it refers to providing an explanation about why a specific response was correct, and it might allow the learner to review part of the instruction. It also might present the correct answer (see below for six types of elaborated feedback).
Attribute isolation	Elaborated feedback that presents information addressing central attributes of the target concept or skill being studied.
Topic-contingent	Elaborated feedback that provides the learner with information relating to the target topic currently being studied. This might entail simply re-teaching material.
Response-contingent	Elaborated feedback that focuses on the learner's specific response. It may describe why the answer is wrong and why the correct answer is correct. This does not use formal error analysis.
Hints/cues/prompts	Elaborated feedback that guides the learner in the right direction (e.g., strategic hint on what to do next or a worked example or demonstration). It avoids explicitly presenting the correct answer.
Bugs/misconceptions	Elaborated feedback that requires error analysis and diagnosis. It provides information about the learner's specific errors or misconceptions (e.g., what is wrong and why).
Informative tutoring	The most elaborated feedback (from Narciss & Huth, 2004), this presents verification feedback, error-flagging, and strategic hints on how to proceed. The correct answer is not usually provided.

## Activity 2: Read and prepare a presentation on formative assessment

Read the section entitled The Concept, p2-3 in the **Paul Black article *The Nature and Value of Formative Assessment for Learning (Reader, p64)***. Analyse and discuss his definition of formative assessment. Does it add to your understanding of the concept?

- a) Work in pairs or threes and choose a section from the Black article to present.

The sections are:

1. The findings: how change can happen - Questioning
2. The findings: how change can happen – Feedback through marking
3. The findings: how change can happen – Peer assessment and self-assessment
4. The findings: how change can happen – The formative use of summative tests
5. Reflections: teachers, students and learning – The big idea: focus on learning
6. Reflections: teachers, students and learning – A learning environment: changes of role
7. Motivation and self-esteem

Choose a section which interests you. Two or three pairs can work on the same section, just make sure that within the whole class, all the sections are covered.

In your presentation include:

- A summary of the main points that Black makes, and maybe an example or two
- Your response to Black's points – whether you agree with him or not, what you think about implementation in your own classroom, etc

## Activity 3: Present aspects of formative assessment

- a) Each pair presents, in the order of the sections in the article. Each presentation can only be 3 minutes, with a 5 minute discussion afterwards, so the timekeeper needs to be strict.
- b) In your discussion, focus on examples and ways of implementation in your own classroom, so you can transfer Black's research findings into your own context.



## Session 6: Elaborating on the prompts for formative feedback

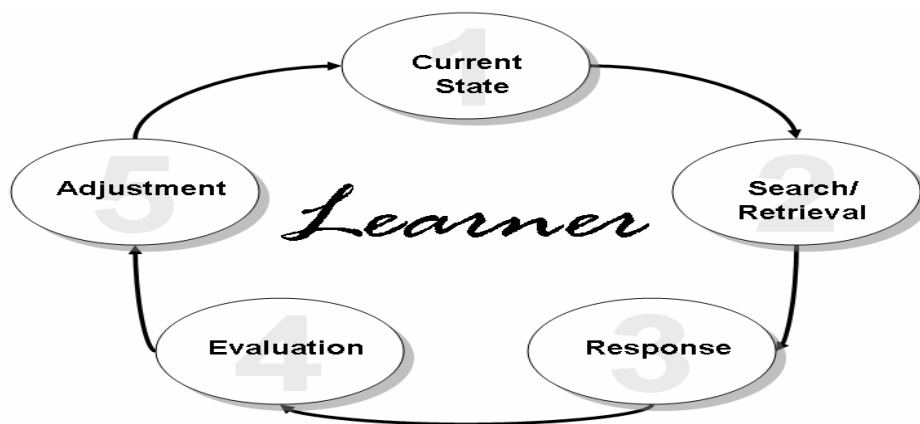
### Outcomes

By the end of this session, you should be better able to:

- Apply different aspects of formative assessment
- Understand and explain how formative feedback can enhance the teaching and learning process

### Activity 1: Reflect on the content of formative feedback

Study the following five-stage model of the learner during a feedback cycle as described by Bangert-Drowns *et al.* (1991, p. 217):



1. The initial or *current state* of the learner. This is characterized by the degree of interest, goal orientation, degree of self-efficacy, and prior relevant knowledge.
2. *Search and retrieval strategies*. These cognitive mechanisms are activated by a question. Information stored in the context of elaborations would be easier to locate in memory due to more pathways providing access to the information.

3. The learner makes a *response* to the question. In addition, the learner feels some degree of certainty about the response and thus has some expectation about what the feedback will indicate.
4. The learner *evaluates* the response in light of information from the feedback. The nature of the evaluation depends on the learner's expectations about feedback. For instance, if the learner was sure of the response and the feedback confirmed its correctness, the retrieval pathway may be strengthened or unaltered. If the learner was sure of the response and feedback indicated its incorrectness, the learner may seek to understand the incongruity. Uncertainty about a response with feedback confirmation or disconfirmation is less likely to stimulate deep reflection unless the learner was interested in acquiring the instructional content.
5. *Adjustments* are made to relevant knowledge, self-efficacy, interests, and goals as a result of the response evaluation. These adjusted states, with subsequent experiences, determine the next current state.

***Discuss in your small groups:***

- a. We've also learned from Alan Cooper in the previous session that feedback should be developmental. How do you think can you develop learners in your class through making use of feedback? Discuss a few ideas in your small groups.
- b. Learners use feedback to improve their performance at writing essays, exam questions, critical reviews, projects, reports etc. Discuss in you small groups how you would apply the following three major factors contributing to the effectiveness of formative feedback in your subject field:
  - ✚ Positivity – stating what is good but also what to correct:
  - ✚ Diagnosticity and specific:
  - ✚ Constructiveness:

***Activity 2: Formative Feedback as Scaffolding***

*In reference to our EDUC2001 module: Approaches to teaching and learning.*

- a. Read the extract from the following report and discuss the main insights that you've found from the report in your small groups.
- b. How can you apply these ideas in your class and include the knowledge in your exam equivalent?

**Research Report (March 2007 RR-07-11)**

**Focus on Formative Feedback - Valerie J. Shute**

**“Formative Feedback as Scaffolding**

*Like training wheels, scaffolding enables learners to do more advanced activities and to engage in more advanced thinking and problem solving than they could without such help. Eventually, high level functions are gradually turned over to the students as the teacher (or computer system) removes the scaffolding and fades away from the process (see Collins, Brown, & Newman, 1989; Graesser, McNamara, & VanLehn, 2005). For instance, Graesser, McNamara, and VanLehn described a theoretically based approach to facilitating explanation-centered learning via scaffolding, including-*

- (a) pedagogical agents that scaffold strategies, metacognition, and explanation construction;*
- (b) computer coaches that facilitate answer generation to questions that require explanations by using mixed-initiative dialogue; and*
- (c) modeling and coaching students in constructing self-explanations. Their systems (i.e., Point&Query, AutoTutor, and iSTART) that were built with these components have shown promising results in tests of learning gains and improved learning strategies.*

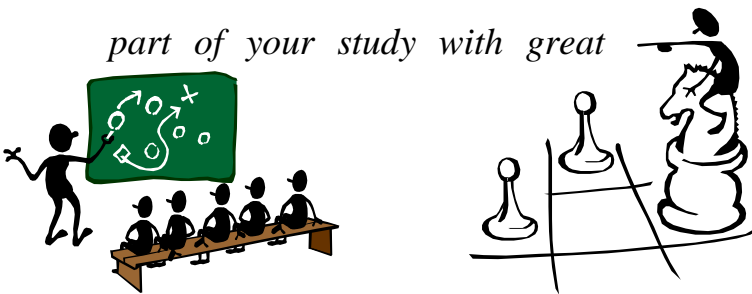
*In their book, How People Learn, Bransford, Brown, and Cocking (2000) described how psychological theories and insights can be translated into actions and practices.*

*In relation to feedback, they suggested a goal-directed approach to learning using scaffolding (or scaffolded feedback) that*

- (a) motivates the learner’s interest related to the task,*
- (b) simplifies the task to make it more manageable and achievable,*
- (c) provides some direction to help the learner focus on achieving the goal,*
- (d) clearly indicates the differences between the learner’s work and the standard or desired solution,*
- (e) reduces frustration and risk, and*
- (f) models and clearly defines the expectations (goals) of the activity to be performed.*

*Conventional wisdom suggests that facilitative feedback (providing guidance and cues, as illustrated in the research cited above) would enhance learning more than directive feedback (providing corrective information), yet this is not necessarily the case. In fact, some research has shown that directive feedback may actually be more helpful than facilitative—particularly for learners who are just learning a topic or content area (e.g., Knoblauch & Brannon, 1981; Moreno, 2004). Because scaffolding relates to the explicit support of learners during the learning process, scaffolded feedback in an educational setting may include models, cues, prompts, hints, partial solutions, as well as direct instruction (Hartman, 2002). Scaffolding is gradually removed as learners gain their cognitive footing, thus directive feedback may be most helpful during the early stages of learning. Facilitative feedback may be more helpful later on, and the question is when. According to Vygotsky (1987), external scaffolds can be removed when the learner develops more sophisticated cognitive systems, where the system of knowledge itself becomes part of the scaffold for new learning. “*

*We trust that together we've planned all the right moves to complete this final part of your study with great success!!*



**Appendix G: Examination Equivalent for Classroom Assessment (EDUC 2002) – 2008**

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*Wits School of Education*

Examination Equivalent

for

Classroom Assessment

(EDUC 2002)

*Advanced Certificates in Education*

University of the Witwatersrand



Due date: 3 November 2008

Time: 8:30

Venue: Wits School of Education (WSoE) Campus: Exam Hall

*Internal Examiner: Ms Celia Booyse*

*External Moderator: Prof Johan Dreyer (Unisa)*

**Please use the file provided to you. You may beautify you file to suit your personal style and subject field.**

**Your file should include:**

- a. *Contents page*
- b. *Evidence of the following*
  - Copies of one formative assessment task, with assessment criteria and/or mark memo.
  - The work of three learners on the formative task. Each learner's task should be clearly labelled: 'very competent', 'competent', or 'not competent'.
  - Your marks and written feedback on the work of the three learners.
  - The learners' feedback about their experience of the assessment to you.
- c. *The descriptive report covering steps 1-5 as indicated below.*
- d. *The assessment reflective (review) report, with references.*
- e. *Your self-assessment using the rubrics above.*

**Please Note:**


**Examinations will be marked only if they are submitted in the file provided .**

- Insert the work in the order indicated above.
- Clearly indicate your full name, surname and student number on the outside cover of the file.
- Please ***do not*** put your work into plastic sleeves.
- Please consult the policy on examination equivalents projects in your introductory booklet, and make sure you know exactly when and where to hand in this examination project. **If you do not come to the examination venue at the right time, you will get a mark of fail / absent.**

## *Exam Equivalent task*

### *Conducting and researching constructive, formative assessment*

#### *Task:*

A small, stylized illustration of a person climbing a ladder, positioned to the left of the main text block.

*You have to conduct a classroom research project in which you demonstrate that you can plan, prepare for and conduct formative assessment in a constructive way. Furthermore you have to evaluate the learners' work and give feedback, where after you have to reflect on the process and value of the assessment.*

*We need to see that you can do constructive planning and be a competent and reflective assessor in your classroom.*

This classroom research project thus has three requirements:

Section A: You need to conduct a classroom research project. You have to demonstrate how you plan, prepare and conduct **formative assessment** work in your classroom. Follow steps 1-5 and show us evidence of what you have done. You further have to show how you applied a constructivist approach in your planning and in the conducting of the formative assessment process.

Section B: You need to write a **descriptive report of 2 pages**, in which you describe the context, how you planned, what you did and how the students responded.

Section C: You need to write a **reflective, analytical report of 6 -7 pages**, in which you reflect on each of the steps, justifying what you did, analysing the students' responses and evaluating the quality of what you did, in relation to the knowledge you gained from the course materials.

*NB! Here is more detail about each section and the steps you need to follow to complete the research project.*

## **Section A: Conducting formative assessment**

### **Step 1: Plan for the assessment**

Choose a formative assessment task that is appropriate for your learners. You can generate a new task. Or you can use one of the three assessment tasks that you generated for assignment 2 and improve it in accordance with the feedback you received and the further learning you have done in Unit 3 of the course materials. Choose what you prefer.

This formative assessment task needs to have clear outcomes, be a good task, fit into the learning programme, be appropriate for your context and the needs of the learners, and also have a mark memo (assessment criteria / rubrics) that clearly shows what type of evidence (competencies / knowledge / skills) you are looking for and how you will allocate marks.

Also plan the assessment process: when the assessment will take place, how long learners can spend on it, how you will organise the classroom, etc.

### **Step 2: Prepare the learners for the assessment**

Prepare the learners for the assessment. This involves being transparent: telling learners about it in good time and making sure they understand the assessment criteria. It also involves having a clear learning programme into which the formative assessment task fits, and teaching whatever is necessary prior to the assessment.

### **Step 3: Conduct the assessment**

Conduct the assessment. Take note of the classroom conditions, the timing, the learners' responses, etc. Make sure the assessment context is not biased against any group of learners. Collect the completed assessment tasks from learners.



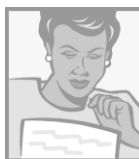
#### **Step 4: Evaluate the evidence and make assessment judgements**

Mark all the learners' work in relation to the assessment criteria and/or mark memo. Then select the work of three learners that you will present as evidence of your assessment: one not yet competent, one competent, one highly competent.

#### **Step 5: Provide feedback**

Write feedback on the work of the three learners you have selected. Write the feedback in a way that is useful, appropriate, related to the criteria and constructive. Also think about what oral feedback you might want to give the individual learners or the whole class, or what you might want to say to parents or the principal about the learners' work.

After you have marked and given feedback, ask the same three learners to write a comment on the assessment task, what their experience was when they did it and what they want to say about the feedback you have given them. This is their feedback to you.



#### **Section B: Descriptive report**

Write a report of about 2 pages in which you describe what you did in Section A: what you planned and what happened during the process of implementing formative assessment. Be aware that we who are reading this description were not there. So in your descriptive report include details about the context in which the assessment took place, like the grade and size of your class, the diversity of learners, the learning programme, the timing of the assessment task in relation to the learning programme, how the learners reacted during the assessment, etc.

In your descriptive report you need to include evidence of what you have done. So you need to attach:

- the formative assessment task, the assessment criteria and/or mark memo and any instructions that learners received

- copies of the three learners' work – one highly competent, one competent, one not yet competent.
- your written feedback on the learners' work, or an account of the oral feedback you gave. Also submit the learners' feedback to you about the assessment task.

### **Section C: Reflective report**



In order to review the assessment you have done, you need to write a report of about 6-7 pages, reflecting on the process of planning and implementing the formative assessment, as well as reviewing how you could improve it for next time. The report must demonstrate your understanding of OBE assessment in general and formative assessment in particular, demonstrating that you have learned from the course and from the action research you have conducted in your classroom.

Make sure to include the following in your report:

Explain your thinking at each step, drawing on the course readings. Justify the choices you made. Critically reflect on whether the assessment task and process were fair, valid and reliable. Show how your task met the requirements of good assessment. Explain in what ways this assessment was formative, using Black's categories of questioning, feedback through marking, self and peer assessment and the formative use of summative tasks. Analyse the learners' work and think about why they are answering in the ways that they are. Think about what their misunderstandings were, how you might change your teaching in response to what you have seen in their writing, i.e. how you could use this assessment formatively. Analyse the feedback the learners gave you. Present the insights you gained by evaluating what went well, what could be improved for next time and what you have learned about assessment from doing this exam equivalent.

Make extensive use of the course materials to justify why you conducted the assessment in the way that you did and for helping you to reflect on what happened, so that you can work with both theory and practice to gain real insights. It is essential that you integrate the concepts, examples and information gained from the readings in

the course with the practice of what you have done in your classroom. Providing evidence of having learned from the course is essential for passing this reflective review of assessment. When using the exact words from the course, remember to put in quotation marks and acknowledge the source by referencing it properly.

Exam Equivalent - 2008

## Wits Advanced Certificate in Education

### Classroom Assessment – EDUC 2002

#### ASSESSMENT CRITERIA

**Outcome 1: Able to hand in a complete classroom research project**

**Total marks: 5**

Level 1	Level 2	Level 3	Level 4
1 mark	2 - 3 marks	4 marks	5 marks
- The research project is totally incomplete. - Most of the items not included.	- The research project is missing one or two items.	- The research project is complete with contents page, evidence, descriptive report, analytical review report, references and self assessment.	- It is also well-ordered and neatly presented.

**Outcome 2: Able to design a formative assessment task that is appropriately linked to a learning programme**

**Total marks: 10**

Level 1	Level 2	Level 3	Level 4
0 – 4 marks	5 – 6 marks	7 marks	8 - 10 marks
- It is not a formative assessment task. - It is not outcomes based, nor does it assess higher order skills. - Instructions are not clear and/or inappropriate for learners - The task is not related to the outcomes or learning programme - The assessment criteria are not suitable to the task, and/or not related to learning programme / outcomes. - There is no indication that course materials were consulted in the generation of the task and assessment criteria.	- The task is used formatively -The task assesses higher order skills - The outcomes, task, assessment criteria and learning programme relate to each other, even if the relationship is slightly confused - Instructions are understandable at the level of the learners - The language of the assessment criteria or mark memo makes sense in relation to the level of the learners. - Task shows evidence of following principles set out in course.	- The formative task addresses a range of higher order skills, worthwhile knowledge and incorporates values. - It is totally appropriate for outcomes and learning programme - Instructions are obvious and clear - The assessment criteria give both learners and teacher clear guidelines for marks and feedback and help to make the assessment process transparent. - Good use is made of principles set out in course.	In addition: - The task is creative and innovative, with accessible layout - The task is well implemented - It assesses a broad range of skills, giving learners with different abilities all a fair chance.

**Outcome 3: Able to appropriately assess and select learners’ formative tasks and provide suitable formative feedback according to set criteria.**

**Total marks: 15**

Level 1	Level 2	Level 3	Level 4
0 - 7 marks	8 – 9 marks	10 – 11 marks	12 – 15 marks
<ul style="list-style-type: none"> <li>- Tasks are not selected correctly</li> <li>- Marks as the only form of feedback.</li> <li>- Some written feedback, but it does not provide formative guidance.</li> <li>- Comments do not relate to what learners did or to the assessment criteria.</li> <li>- No reflection on learners’ performance.</li> </ul>	<ul style="list-style-type: none"> <li>- Tasks are correctly selected in levels of competence.</li> <li>- Feedback is formative and identifies some strengths and weaknesses of the learners.</li> <li>- Feedback relates in some way to outcomes and assessment criteria.</li> </ul>	<ul style="list-style-type: none"> <li>- Drawing on the assessment criteria, the feedback gives learners useful insight into their level of skill and how they can improve.</li> <li>- Marks, assessment criteria and feedback relate to each other.</li> <li>- There is reflection on learners’ performance overall.</li> </ul>	<ul style="list-style-type: none"> <li>- Formative feedback is well-formulated, focussed on core strengths and weaknesses, gives guidance on how to improve skills and explains the outcomes and assessment criteria where appropriate.</li> <li>- Feedback and reflection on learners’ performance is woven into further teaching.</li> </ul>

**Outcome 4: Descriptive report: Able to describe the implementation of a formative assessment process in a constructive way**

**Total marks: 20**

Level 1	Level 2	Level 3	Level 4
0 – 9 marks	10 – 11 marks	12 – 15 marks	16 – 20 marks
<ul style="list-style-type: none"> <li>- Did not follow all the steps of the assessment process.</li> <li>- Difficult for reader to understand what happened in the classroom or during the assessment process.</li> </ul>	<ul style="list-style-type: none"> <li>- All the steps of the assessment process were implemented.</li> <li>- Description covers context, plan and implementation process.</li> <li>- Description outlines what happened with some clarity and detail.</li> <li>- Few detail about a constructive way of planning</li> </ul>	<ul style="list-style-type: none"> <li>- The assessment process was implemented appropriately to context and with care.</li> <li>- Description includes learners’ responses and things that changed on the spur of the moment.</li> <li>- Description includes detail of how planning was done according to a constructivist approach</li> </ul>	<p>In addition to level 3:</p> <ul style="list-style-type: none"> <li>- Description provides reasons for why things were decided and done as they were.</li> <li>- Comprehensive explanation of the planning, conducting of process constructively</li> </ul>

**Outcome 5: Reflective report: Able to review, reflect on and evaluate the assessment process.**

**Total marks: 30**

Level 1	Level 2	Level 3	Level 4
1 - 14 marks	15 -17 marks	18 - 24 marks	25 – 30 marks
<ul style="list-style-type: none"> <li>- Repeats description but no reflection and analysis.</li> <li>- Confused understanding of course concepts such as fairness, characteristics of good assessment tasks, formative assessment, etc</li> <li>- Not able to review strengths and weaknesses of task or assessment process.</li> <li>- Cannot suggest improvements.</li> </ul>	<ul style="list-style-type: none"> <li>- Basic reflection on and analysis of task and assessment process.</li> <li>- Correct understanding of course concepts, especially formative assessment.</li> <li>- Able to outline some strengths and weaknesses of the task and process in relation to its context.</li> <li>- The task and process are described with reference to the course concepts.</li> <li>- Ideas in the different sections of the report relate to each other in some way.</li> </ul>	<ul style="list-style-type: none"> <li>- Depth of reflection in review and analysis of task and process.</li> <li>- Comprehensive understanding of course concepts.</li> <li>- Review is done with appropriate reference to course concepts, particularly from Black.</li> <li>- Integrates concepts with the analysis, reflecting an understanding of the relationship between theory and practice.</li> <li>- Analytical and evaluative comments are backed up with evidence.</li> </ul>	<p>In addition to level 3:</p> <ul style="list-style-type: none"> <li>- Presents valuable insights into assessment tasks and processes.</li> <li>- Has used course readings to generate good assessment practice.</li> <li>- Have excellent insight in formative assessment conducted constructively</li> </ul>

*See Outcome 6 on next page*

**Outcome 6: Able to write coherently, structure and organise a research report.**

**Total Marks: 20**

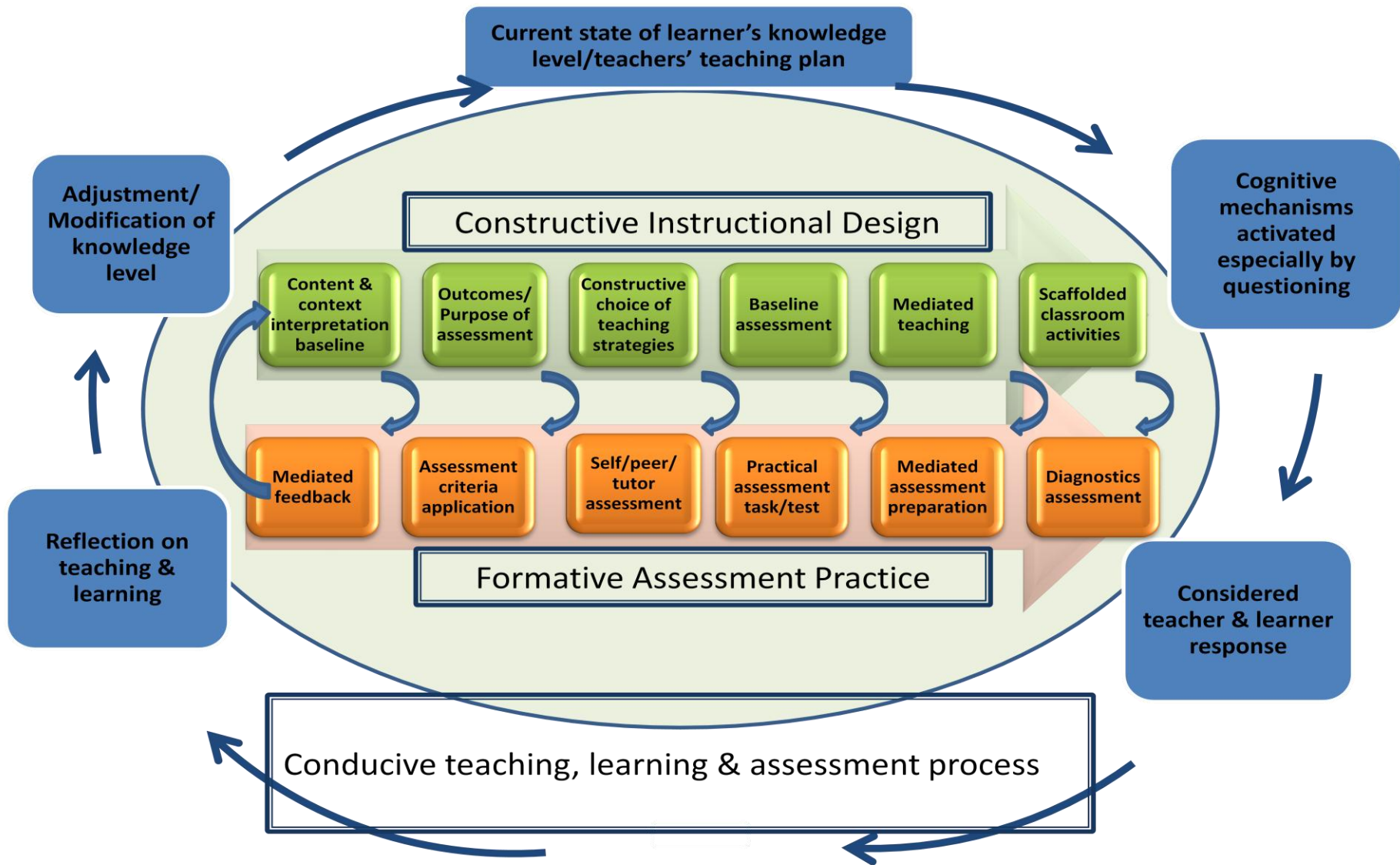
Level 1	Level 2	Level 3	Level 4
0 – 9 marks	10 - 11 marks	12- 15 marks	16 – 20 marks
Poor organisation of ideas and writing evidenced by: - Isolated ideas with little depth or elaboration. - Chunks copied from course. - Content and structure across the different parts of the research report are repetitive, confused or difficult to follow.	- A fair attempt to organise research report, with structure acceptable. - Attention to the introduction & conclusion. - Elaboration on some of the ideas, giving appropriate examples even if not clearly integrated. - Different pieces of the research report relate to each other.	- Well-organised report with interesting intro, summarising conclusion, logical structure and fair coherence. - Ideas clearly expressed, with elaboration and integration of examples. - References to and quotes from the course & articles to elaborate on / justify points made.	In addition: - Report provides a focused argument, with clear evidence. - Language is fluent, correct and well chosen. - Correct referencing

Outcome	Maximum	Self-assessment	Final assessment
1 – complete research project	5		
2 – formative assessment task	10		
3 – assess and provide feedback	15		
4 – describe implementation	20		
5 – reflection on assessment	30		
6 – write coherently	20		

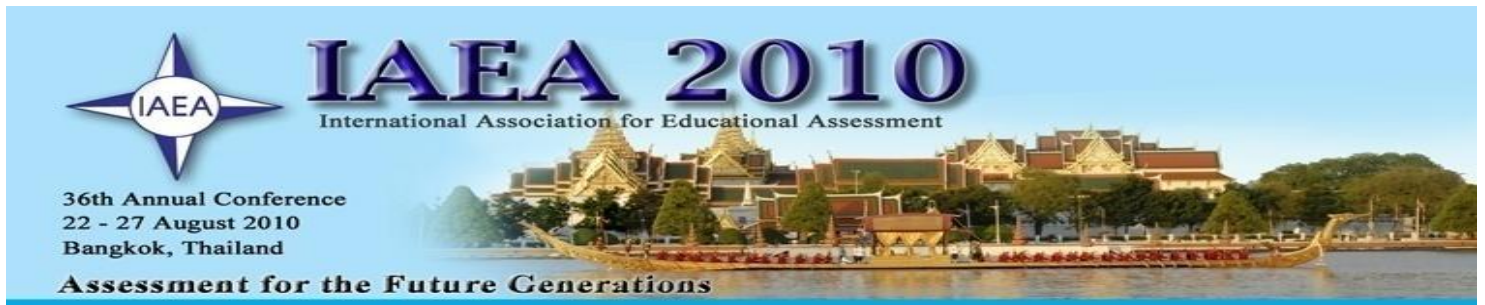
	Maximum	Self-assessment	Final assessment
<b>Total</b>	<b>100</b>		

**Appendix H: Constructive model for instructional design and assessment practice**





## Appendix I: Conference paper delivered at the IAEA 2010



**From:** IAEA Conference 2010 [mailto:iaea2010@ipst.ac.th]

**Sent:** Monday, May 10, 2010 10:30 AM

**To:** Celia Booyse

**Subject:** notification of acceptance

Dear Ms Celia Booyse,

We are pleased to inform you that your abstract entitled

"The value of formative feedback for the millennium learner - a motivational approach in the futuristic classroom "

and  
"The quest to turn on the taps in constructive assessment"

and

"Creating a learning gap – assessment for the purpose of learning as future challenge"

have been accepted for presentation at IAEA 2010. As stated in our website, the participant can present as a primary presenter for only one paper. However, you can be the additional presenter for another paper if you can find the primary presenter for that paper. Please make your decision and check your accepted abstracts in the attached file. If you have any correction or decision, please reply to us within May 17, 2010.

We look forward to receive your full paper within June 30, 2010. Attached are the guidelines for the submission of complete papers which should be followed strictly. Please save your paper as a single file in Microsoft word 2003 (\*.doc), format using Times New Roman 11-point font size and single-spacing, and send it as an e-mail attachment to iaea2010@ipst.ac.th

Please kindly be reminded that all papers submitted for presentation can only be included in the final program and printed in the Conference Proceedings if received from participants who have already registered for the conference

and have paid the full registration fee.

As a presenter, we are pleased to announce that you can get an early bird rate if you register within May 21, 2010. Please inform us via e-mail before starting the registration process.

We look forward to seeing you at the IAEA 2010 conference in Bangkok.

Yours sincerely,



Precharn Dechsri, Ph.D.

Chair of IAEA 2010 Organizing Committee

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### **The quest to turn on the taps in constructive assessment**

Celia Booyse, Umalusi – Council for Quality Assurance in General and Further Education and Training, South Africa

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In a globally interdependent world, educators are charged with preparing learners for this complex, interactive world. Many research efforts stress that radical improvement regarding abilities is necessary because a critical shortfall of particular skills and abilities in learners leaving school, which is a significant constraint in economic growth. This educational challenge requires educators to develop learners with critical, creative and conceptual minds, but still to teach the required content. Therefore developing the individual learner's ability to construct his or her own meaning for new concepts is a prerequisite for the classroom. So is the development of the learner's ability to solve increasingly complex problems in the learning area as well as in daily life. This revivifies the question of how to plan, structure and assess in order to accommodate these requirements while enhancing learner abilities and achievement. Assessment - as an integral part of planning and actual instruction - then needs

constructively to reflect how significant understanding at the conceptual level can be fostered, how understanding can be transferred across time and situations and how the assessment presupposes the relation with prior knowledge and to identify the understanding of patterns and connections. (*Words: 170*)

Key words: educational challenge, conceptual development, construct meaning, transferrable understanding, metacognition, formative feedback, assessment for learning.

### **Introduction and background**

In the early 1990s the shift from an industrial age to an information age, which required the ability to access, interpret, analyze, and use information for making decisions, was clearly stated in a document from the U.S. Department of Labor (June 1991:xvii-xviii). Eighteen years later (in 2008), this global trend to emphasize skills and competencies needed to succeed in the workplace has become increasingly evident. In various news clips in South African newspapers, the previous Minister of Education argued that the matric examination question papers should reflect these specific abilities that are globally appropriate. She made it clear that matric (Grade 12) candidates should be able to demonstrate the cognitive skills related to problem-solving as well as extended writing skills. Christie (2008: 41) explains in her book “Opening the doors of learning” that the challenges of globalization in the contemporary society are so different that they call for new understanding and more innovative theoretical approaches.

Erickson (2007: 1) argues that in a globally interdependent world, the concept “complexity” frames the socio-political and environmental issues of the day and teachers are charged with preparing learners for this complex, interactive world. The reality of this educational challenge is then especially to foster the development of critical, creative and conceptually receptive minds in learners, but still to teach the required content. Pink, in his book “A Whole new mind: Moving from the Information Age to the Conceptual Age” (2005: 1-69) highlights the increasing importance of creative thinking and the ability to construct one’s own meaning for new concepts also by being able to solve increasingly complex problems in daily life. This creative thinking ability will almost certainly include metacognitive assessment of the thinking. This notion of metacognitive assessment reinforces the idea that assessment needs to reflect how significant understanding at the conceptual level can be established, how understanding can be transferred across time and situations and how the

assessment presupposes the relation with prior knowledge in order to confirm the understanding of patterns and connections.

The idea that at the heart of every “modern” curriculum reform is the notion of active learning which focuses on the provision of a platform for developing knowledge, skills and competencies for innovation, social development and economic growth, is central in the World Bank Working Paper, No 128 (2008: 43-45). From the investigation done by the World Bank (as reported in World Bank Working Paper, No 128), the pedagogical idea behind active learning is to provide learners with the opportunity for active engagement with learning matter for them to construct knowledge themselves instead of reciting facts. Regarding planning and the choice of teaching strategies, it seems clear that the underlying methodological principles which may lead to improved and adapted classroom activities are centred around learner participation with the emphasis on holistic development, critical thinking and the integration of knowledge (World Bank, 2008: 44).

The question now is how to plan, structure and assess to accommodate these requirements in the assessment of higher order skills, abilities and achievement in a world which demands this knowledge and these abilities.

### **The quest for facilitating the understanding of concepts**

Changes in the skills and knowledge needed for new abilities and good performance, will have an effect on the understanding of how learners learn as well as the relationship between teaching and assessment. Bransford, Brown and Cocking (2000: 37-42) are of opinion that a strong base of factual knowledge is important for thinking and problem-solving, but it is the ways in which such knowledge is mentally organized that makes the difference between real understanding and just the reciting of facts. There is a need to shift from the merely informative, if learners are to reach higher conceptual levels of understanding. Learners who have reached a higher conceptual level will not only grasp the critical factual knowledge, but also understand the generalisations and principles and can therefore apply these in new contexts. Consequently, to accommodate such a shift, teaching, learning and assessment should be seen as being in a triangular relationship where planning for teaching - and assessment practices - also has to change. It is therefore important to focus on how the organization of knowledge can be made more accessible to the learner to construct his or her own understanding and then provide proof of understanding in the assessment process.

The organisation of knowledge and therefore the quest for understanding concepts is closely linked to whether “teaching” is done to bring about learning and understanding concepts. Through effective teaching suitable conditions are set for learning to take place, and this does not mean that teaching is confined to instructing and demonstrating because learners must acquire certain knowledge which differs from content and concepts. Learners should also acquire interpreting, analysing and application skills to be able to transfer and apply knowledge in new contexts. Egan (1998: 28) argues that the purpose of “teaching” is to lay out a logical path that the mind of the developing learner can follow with maximum ease to ensure understanding and therefore to be able to create his or her own meaning for concepts.

Language is the most prominent mediating tool that shapes the understanding of new concepts. The teacher should acknowledge the importance of the effective use of language in the teaching-learning process to enable learners to more easily grasp particular concepts. Mediation of concepts happens most effectively through language, and through the interaction between learner and teacher, since, in the process of negotiating a common meaning, both learner and teacher will discover how each of them learns, what their assumptions are and how to best find meaning of new concepts and content.

In addition, learners find the challenge of coming to grips with new concepts much easier if their motivation levels are high. Motivation to learn grows from a close and connection between planned teaching and effective assessment. Many assessment practices, in particularly traditional multiple-choice and true-false assessments, test facts and skills in isolation, offer neither the opportunity nor the motivation to learn. The use of only standardized tests are most often demotivating, because over-reliance on this type of assessment often leads to instruction that stresses basic knowledge and skills.

As seen above, the quest for understanding concepts links to a process of identifying and structuring important knowledge and to establish own meaning to concepts through the application of knowledge and thinking skills in new contexts. The real understanding of concepts is dependent on to the ability to find ways to structure and to transfer knowledge in order to develop what Anderson and Krathwohl (2001: 42) call “deeper understanding”. Erikson (2007:38) explains the finding of “deeper understanding” as the process that shapes a

“conceptual mind” in order to reach the level where knowledge can be applied in a new context.

It is therefore clear that only when they are understood, do concepts become transferable to new context, and it is only then that a true understanding of those concepts actually exists.

When thinking about how teaching can be planned and how to guide learners to the understanding of concepts, Feuerstein’s work on the modification of knowledge comes to mind. Coming to grips with concepts requires a modification of understanding, which in turn leads to a higher cognitive level and ability, which in turn prepares the learner to take up higher demands and challenges in assessment tasks.

### **Mediated learning as preparation for assessment: the Feuerstein-model**

Feuerstein presents the view that cognition is a variable; and that thinking patterns can change and consequently that intelligence is modifiable. He states that changes in “the state of the organism”, can be brought about by a deliberate program of intervention, but only when “the organism” is receptive and sensitive to internal and external sources of stimulation. In other words in a teaching-learning situation, the learner can learn to learn how to learn and has the capability of modifying the underlying structure of his or her cognition. Feuerstein calls this process through which the capacity to adapt to environments can be developed, “the mediated learning experience”. In this mediated learning experience, language is pivotal for a learner to be able to broaden his or her understanding and to connect it with previous experiences and cultural background. In this way learners link diverse aspects of experience together meaningfully.

In the Feuerstein approach the teacher’s main role is thus that of a mediator, whose task it is to help the learner to learn, to grasp new concepts and reach a higher level of understanding. The task is not aimed at placing a specified body of knowledge into the learner's head. The mediator works with the learner in such a way that both of them discover how the learner (and the mediator) learns and how to improve the learner's learning process in such a way that proof of learning will be evident in the assessment process.

Feuerstein’s theory of mediated learning argues that to a large extent the diversity in learner performance reflects the different needs for mediated learning and that meaningful learning

and the development of new concepts cannot happen without mediation. Mediated learning differs from direct or experiential learning in that in the mediated learning experience there is the intervention of a human to filter the environment for the organism. Instead of the direct Stimulus – Response (S – R) of Skinner (as propounded in Behaviourism) or the Stimulus – Organism - Response (SOR) of Piaget), Feuerstein instead proposes a Stimulus – Human – Organism – Human – Response model (SHOHR). The mediator's intention according to the Feuerstein model is NOT to help the learner to solve the problem posed by the stimulus. It is rather to understand, with the learner, the process whereby the learner learns. The stimulus, in the form of a task (or assessment), is designed to make it possible for the two of them to investigate this process. According to Feuerstein's "Mediated Learning Experience", a learner is involved in a three-step learning process. In the first step the learner receives the stimulus which has been especially designed to make it possible for the learner and mediator to gain insights into the learning process. In the second stage the learner processes the information. In the third stage the learner decides upon a response, and is also assisted by the mediator. This means that the learner involves himself or herself intentionally in the learning process and gradually develops a greater understanding of how best to learn. Furthermore it means that the teacher's involvement does not end at teaching, but stretches further into mediation in the assessment process as well.

To ensure a quality mediated learning experience, the teacher as mediator has to explicitly convey to the learner his or her intention to mediate, whereby the learner reciprocates by being consciously aware that he/she is learning. The process of learning has to be in the minds of both learner and teacher when teaching and assessment are planned. Learners should become as aware of the 'how' of their learning as they are of the 'what'. It's therefore important to note that intentionality and reciprocation is a vital two way street in the teaching-learning-assessment process which ought to result in true communication between teacher and learner as part of effective mediation.

Feuerstein argues that mediation of meaning occurs when the mediator communicates the importance and reason for an activity – only then a learner would get a holistic view on why he/she has to learn particular content. Without finding reason for dealing with particular content, being motivated and having the courage to seek new skills to master, a learner most possibly will not take up the challenge to construct and/or reconstruct own meaning of concepts. Effective mediation means then that the teacher not only mediates particular



meaning, but also encourages and conveys a feeling of the learner's potential competence to engage with the learning content or assessment task at hand. This further emphasises the interrelationship between motivation and whether actual learning will take place in the absence of true motivation.

The process of mediation strengthens the learner's sense of competence and belief in his/her capacity to solve new problems. The first hand experiencing of having mastered problems previously in similar mediated learning experience provides both the motivation to try again and the confidence to work with problems not encountered before. This sense of rising to the challenge may be more powerful than any external acknowledgement and motivation, because in this case a double-sided motivational process can develop. While learners become motivated through successful completion of (challenging) tasks, they gain even more confidence and motivation to embark on more complex challenges. This further suggests that a motivated learner who has an improved understanding of his/her learning, may convey and explain his/her understanding much better and will be able to demonstrate understanding of concepts in assessment tasks. These ideas vivify the assumption that sustaining motivation to learn is also strongly dependent on the learner's confidence in his or her potential for learning.

Over and above the focus on mediation per se, the learner as a unique, complex and multidimensional individual with unique needs which are embedded in a particular cultural background, should also get specific attention. This takes mediation of learning into another dimension where the learner's individual understanding of concepts requires specific planning from the teacher, specific use of language and the choice of particular purposes of assessment.

### **The learner's individual understanding of concepts**

The notion that the learner is an actively involved individual in the learning process, breaks with the traditional receptive role the learner used to play. To further the thinking about the learner as individual, it becomes important that the teacher realizes that the learner brings along his or her background, culture or embedded worldview to the teaching learning environment. Although historical developments and symbol systems, such as language, logic, and mathematical systems, are inherited by the learner as a member of a particular culture and through time these becomes part of the learner, all can be utilized in the

mediation process. Instead of seeing the learner's cultural background as a burden to overcome, it can be used to provide the necessary context for effective mediation which will help to shape the knowledge and truth that the learner creates, discovers and attains in the learning process. Social interaction with knowledgeable members of the society whereby the social meaning of important symbol systems is evident and learning how to utilize them, is valuable existing or prior knowledge that the teacher may include in a planned mediated learning experience.

Learners do not simply mirror and reflect what they read. Learners also have the ability to find regularity and order in events, text and content even in the absence of full or complete information; and that happens because learners use their backgrounds and prior knowledge to make sense of what they are involved in.

The teacher can plan teaching activities and assessment tasks in such a manner that learners with different skills and backgrounds collaborate in tasks and discussions in order to arrive at a shared understanding in a specific field. In such a way the learner in his or her uniqueness becomes the owner of own ideas and the independent master of his/her achievement, but share the understanding with others in the group. This is how a wealth of understanding is built and the learner most probably will find various substantiated alternatives as possible ways to deal with questions and answers to stated problems.

If a planned, mediated learning experience acknowledges the learner as an individual, uses language most effectively as a shaping tool in mediation and has as result a motivated learner encouraged enough to take up more complex challenges in the teaching-learning situation – the question still remains what can then be identified as constructive purposes for assessment to follow through with the mediation process?

### **Constructive assessment purposes**

The most common assessment purposes according to Borich and Tombari (2004: 1, 43, 44) are to grade, sort, to promote, select or evaluate. But this is a far cry from the idea of mediation and the acknowledgment of the learner as an individual or to include assessment as part of the mediation process. Thinking about the components to include in constructive assessment and which are essential to assess the learner's individual ability needs will include explicitly setting outcomes and criteria, the use of close-to-reality contexts; ideas about

individual formative feedback and the fostering through a mediation process - the ability to self-assessment.

So, to turn on the taps in constructive assessment needs a paradigm shift in the thinking about assessment. Assessment is best viewed as an integral part of the teaching-learning situation embedded in and mediated through language and as an opportunity to prove a modified individual understanding of knowledge. Such a view on assessment provides an opportunity to diagnose, guide and motivate through constructive, formative feedback in order for learning to take place in and through the assessment process. This does not mean that one assessment task can be used to fulfill all these purposes, but to identify in the teaching-learning-assessment process some problematic areas which gives the opportunity to support and could be used to follow up in future tasks and feedback to the learner.

The following purposes work constructive assessment in hand:

### **Assessment to diagnose**

The use of assessment tasks to diagnose enables the teacher to adjust teaching to suit the current level of understanding, or to identify whether the learner has misunderstandings about particular concepts or lacks a particular skill which would improve understanding. The results of diagnostic assessment may guide the planning for teaching and assessment in finding answers to the “why”, “what” and “how” questions of assessment, consequently the teacher’s explanation of the reasons for particular assessment tasks, the choice of assessed content and level of questioning becomes easier. This also implies that the teacher will find content specification (“what”) for particular tasks easier and the format (“how”) in which the assessment will be embodied becomes clear. To improve the effectiveness of assessment for diagnostic purposes, will require that the learners exactly understand the expectations in the task, otherwise the teacher won’t be able to clearly identify and pinpoint the problematic areas.

A variety of tasks will help the teacher to find out where and with which particular content the learners are struggling, will guide the teacher to the choice of teaching strategy or to change the teaching strategy used in particular situation to result in constructive and effective teaching and learning.

### **Assessment for guidance and motivation through constructive, formative feedback**

Assessment that encourages learning fosters motivation by emphasising progress and achievement rather than failure. By giving positive feedback, teachers can use assessment to create a stimulating environment that encourages learners to learn, while guiding the learner's progress to his/ her own understanding of new concepts and content. This is possible when learners are given credit for what they can do, rather than being penalised for what they haven't yet mastered.

In order to use formative feedback effectively, the assessment should not be seen as more frequent testing or as an informal assessment which actually limits the purpose of improving learning. Formative feedback should be seen as a process in which *information about learning* is provided and used to modify the teacher as well as the learner's understanding of how and on what level learning took place. Therefore formative feedback needs to be specific, immediate and personally addressed to the individual learner. It is therefore important that teachers should pinpoint the learner's strengths and advise on how to develop them; be clear and constructive about any weaknesses; and on how these might be addressed so that learners improve upon their work. Formative feedback becomes especially worthwhile when effective learning happens and learners appreciate the immediate cumulative impact on their efforts.

It may well take several feedback cycles to register an impact. The feedback should therefore be continuous and automatic to ensure an immediate impact on the teaching-learning situation. Formative feedback may take on different forms of which moving about the room and using a conversational approach, may well be needed to strengthen the understanding of written feedback. A conversational approach fits perfectly into the mediated learning experience which was referred to previously as to be part of the Feuerstein model.

The developmental nature of formative feedback is corrective by design, whereby teacher and learner can note what has been completed successfully and correctly, but also to note what is still lacking in order to be able to complete successfully. Any improvement, however small, should be focused on direction and encouragement to all learners no matter what level or stage of the learning cycle they are at. This further strengthens assessment as part of the mediation process. Recognising the full range of achievements of all learners makes formative feedback to be constructive due to the motivational effect of such feedback, which

then fires learners on to achieve their best. In such a manner, learners become self-motivated to learn even more and become better able to master the next step. In this way the learner turns into a strategic and effective learner.

Formative feedback also carries an evaluative character. Although either a numerical or alphabetical mark may be awarded to the work done, the reasons for awarding a particular mark should be part of the feedback which serves then as plan (guidance) for further improvement.

### **Assessment to improve self-reflection and reflection on learning**

Where teacher and learners are working collaboratively, a metacognitive element of “I know what I’ve learned and why”, is of utmost importance. Teachers can promote learners’ metacognition (reviewing yourself how you learn), by guiding the learners to become more conscious of their learning skills by asking them to reflect on effectiveness, evaluate strategies, their own understanding and particular skills.

To develop the ability to engage in self-reflection and to identify the next step in their learning, deepens the learner’s ability to seek out and gain new skills, new knowledge and new understandings. Teachers can equip learners with the desire and the capacity to take charge of their learning through developing the skill of self-assessment. Commencing with the assessment process by including an explanation and giving reasons why certain tasks are important and talking about links and goals will encourage learners to get involved in self-assessment. In this sense self-reflection is encouraged by mediation and encouragement to engage with the assessment task. Also the understanding of set criteria, the knowledge of how to apply a particular set of outcomes in answering questions and being able to value one’s own work, develops learners’ capacity for self-assessment so that they can become reflective and self-managing.

Teachers sometime find it difficult to separate learning skills from the tasks and the things to be learned. On the other hand it seems to be useful to stand for instance outside the reading process (language teaching), and think about strategies which not only improve skills in reading, but also help in understanding the content.

### **Assessment for learning to take place**

Assessment for learning involves a constructive integration of teaching, learning and assessment. In class, this means using assessment as a basis for further learning, or doing informal assessment during group work, or while the learners are busy with a project.

Small changes like the way how questions are formulated, the use of various levels of demand in questions and even an aspect like the “wait time” for verbally-asked questions impact on performance and how effective assessment. Black et al. (2003: 33-42) mentions several points of improvement in learner performance if “wait time” is increased, namely that the learners answer with more confidence, the answers are longer and includes alternative explanations and some learners even improve the attempts of others. Although increasing “wait time” may seem difficult for teachers to apply due to the habitual desire to add something immediately after the answer is given, the ones who persevere in the efforts, come to see the value in the changed approach. The teacher who increase own “wait time” further provide the opportunity for sustained discussion in the classroom which also works hand-in-hand with learning.

Teachers also gain confidence in asking effective questions also by discussing and co-practice questions with colleagues and the learners. Effective questioning improves the quality of the task at large, but also encourages learners to give thoughtful answers and not simply agree or disagree with a statement. In such instances learners may struggle to justify their answer because they do not really understand what they agreed with. A question like:” Some people describe friction as the opposite of slipperiness. Do you agree or disagree?” was changed to “Some people describe friction as the opposite of slipperiness. What do you think?” which according to the research done by Black et al (2003: 33-42) encourages learners to provide more substantiated full answers.

The following three aspects of assessment for learning need special reference:

- Assessment for learning should be an integral part of constructive planning of teaching and learning

A teacher's planning should provide opportunities for both learner and teacher to obtain and use information about progress towards learning goals. It also has to be flexible to respond to initial and emerging ideas and skills. Planning should include strategies to ensure that

learners understand the goals they are pursuing and the criteria that will be applied in assessing their work. How learners will receive feedback, how they will take part in assessing their learning and how they will be helped to make further progress should also be planned.

- Assessment for learning should be recognised as central to general classroom practice. Tasks and questions which prompt learners to demonstrate their knowledge, understanding and skills are all part of assessment. The teacher observes and interprets what learners say and do during tasks, in order to judge how learning can be improved. These assessment processes are an essential part of everyday-classroom practice and involve both teachers and learners in reflection, dialogue and decision making.

- Assessment for learning should be sensitive, constructive and acknowledge the emotional impact of any assessment

Teachers should be aware of the impact that comments, marks and grades can have on learners' confidence and enthusiasm. Comments that focus on the work rather than the person are more constructive to motivate learners and in order for effective learning to happen.

When learners have a good understanding of what it is they must attempt to achieve, the achievement becomes quicker and easier. Understanding and commitment follows when learners are involved in the deciding goals and identifying criteria for assessing progress. Learners feel more comfortable in the teaching-learning situation if a teacher communicates assessment criteria in terms that they can understand or by providing examples of how the criteria can be met in practice. Understanding such assessment criteria enables learners to fare better in doing peer and self-assessment.

### **Closing remarks**

The quest to turn on the taps in constructive assessment requires the teacher to think of teaching, learning and assessment as integrated and interrelated parts of the educational process. Furthermore the quest requires new thinking about planning for teaching, learning and assessment; to observe learning and to analyse and interpret evidence of learning in order to provide formative feedback to learners. It is also clear that motivation can be enhanced by assessment methods which protect the learner's autonomy, provide constructive feedback, and create opportunity for self-direction and sharpening the ability to reflect and self-assess. In the teaching-learning-assessment process for the role of mediation through language and

the importance of the meta-cognition should be highly valued. It can be concluded that constructive teaching and assessment is a collaborative effort between teacher and learner in order for “deep learning” to happen. Only when assessment *with* learning is the core focus, will the global requirement for critical thinking and the application of higher order skills be reached.

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